# GAS JOURNAL

LIGHT ✦ HEAT ✦ POWER ✦ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CXC. No. 3492.] LONDON, APRIL 23, 1930. [82ND YEAR. PRICE 1s.



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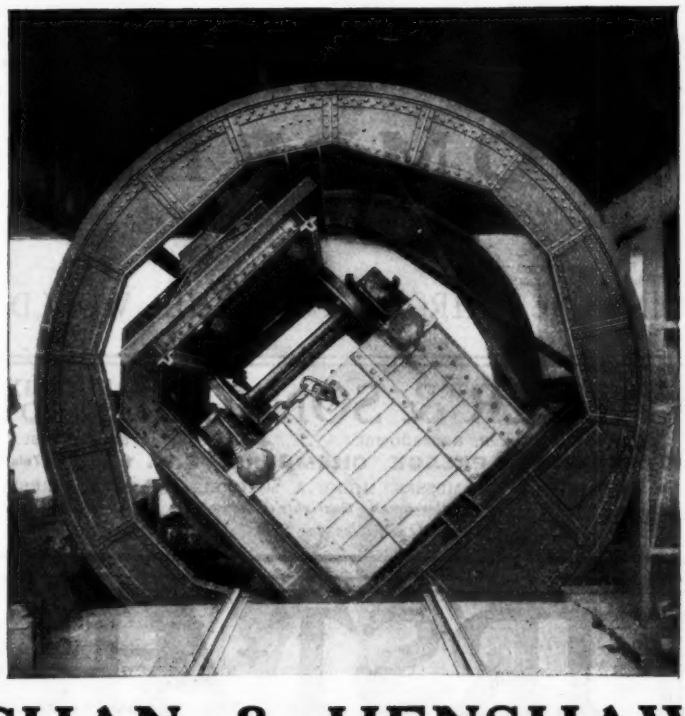

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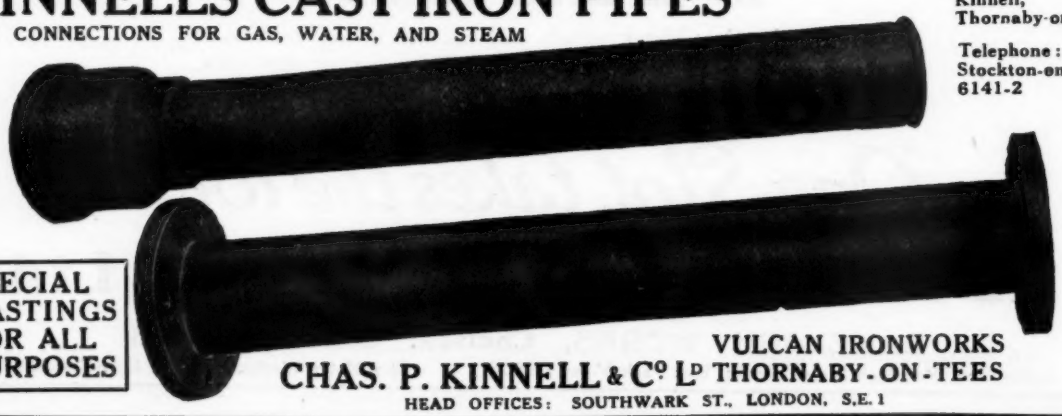

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# Protection for
## Services and other small diameter pipe

A small trouble that is difficult to reach is more annoying and expensive than the failure of a major unit which is easier of access. The corrosion of services or other pipe of small diameter may prove as costly as the deterioration of street mains or the larger distribution lines.

Services, branching out from the street main, are usually laid under curbing, sidewalks, roads, walls, lawns and other forms of permanent construction where access for reconditioning or replacement is not only a considerable expense to the gas or water company, but a source of disturbance and annoyance to the consumer.

Services, moreover, are frequently laid in proximity to electric lines where stray currents lead to electrolysis. They are also laid in streets and alleys where ashes and refuse give rise to a more rapid rate of corrosion. As this small-sized pipe has thinner walls to start with, it is less able to withstand these corrosive attacks than in the case of larger, heavier-walled lines.

The protection of small pipe is as necessary as with any pipe of larger size. It is, therefore, desirable to use a protective coating that is, in every way, as dependable and permanent as that used for the most important mains. "Bitumastic" Enamel—"The Proven Protection for Pipe Lines"—has, during more than forty years, shown itself to be the most dependable and economical coating for pipe lines of every size. Part of its economy, however, depends on using the most efficient method of application, and, as methods vary with sizes of pipes, it was necessary to determine the most practical and economical way of coating pipe of small diameter.

While "Bitumastic" Enamel is usually spread on large sized pipe by means of a brush, canvas sling or special rolling rig, it has proved more economical and efficient to dip the small sized pipe directly into the molten enamel. We have, therefore, developed a system of dipping utilizing plugs, tongs and easily constructed dipping troughs—which is used with great success by leading gas companies, and which has made the protection of small diameter pipe as simple and as inexpensive in application as it is beneficial and long-lasting in results.

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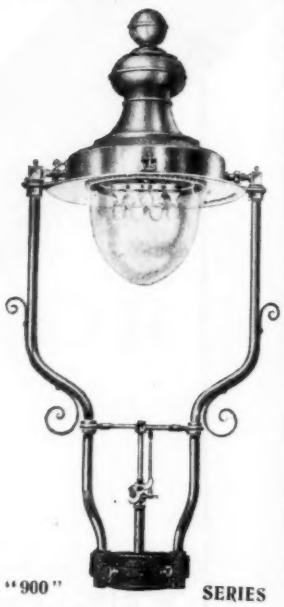

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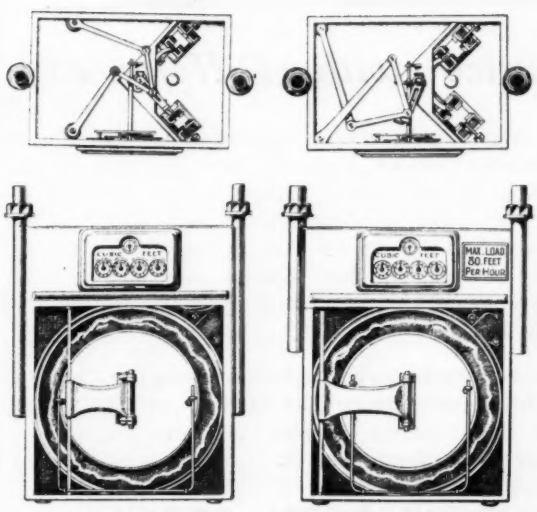


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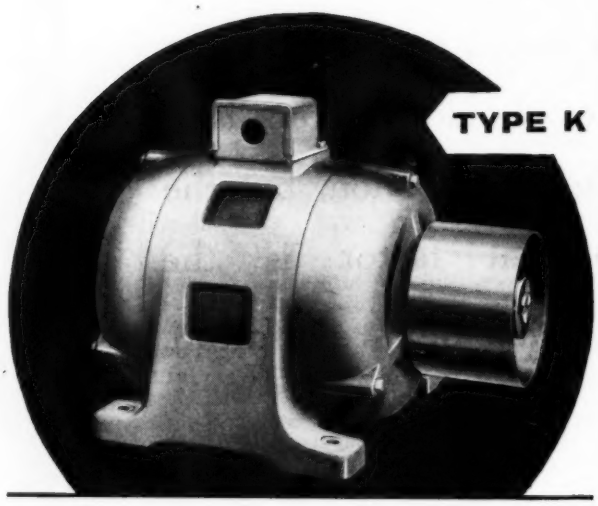


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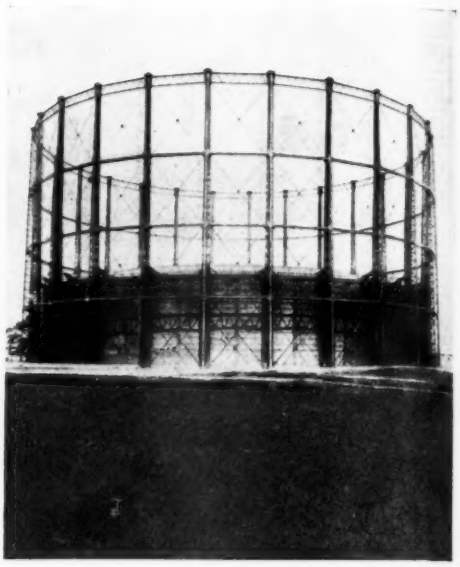

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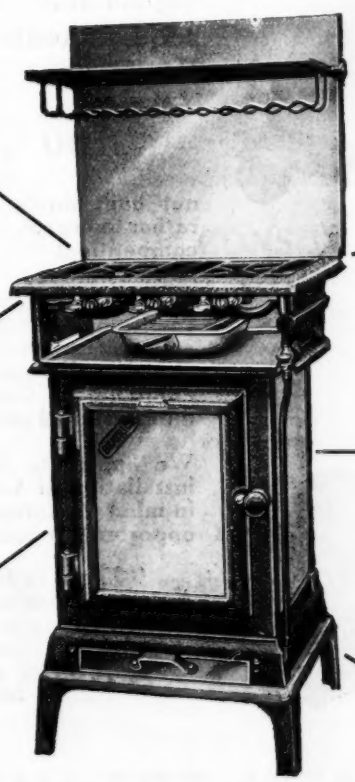

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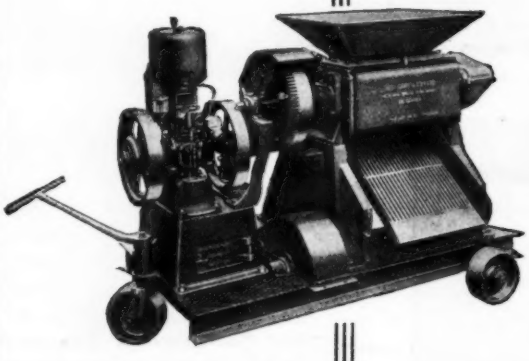
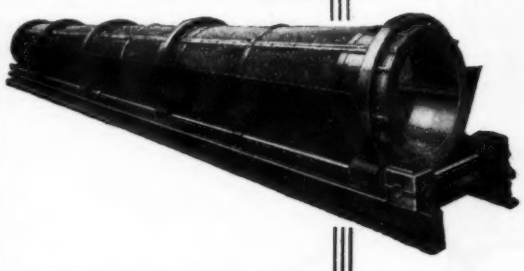


**Cort's Coke Cutting and Grading Plant is the outcome of long experience in supplying the requirements of discriminating Engineers. It is**

## 100 % VALUE,

**not built down to a price, but designed rather to create a standard of quality above competition.**

**Special attention has been given to the countering of the abrasive and corrosive action of coke wherever it is in contact; thus ensuring the maximum of service at the minimum of Cost for upkeep over long uninterrupted periods.**



**We appeal to Engineers considering the installation of Coke Handling Plant to bear in mind the foregoing points—and it may be opportune to quote John Ruskin :—**

***"There is hardly anything in the world that some man cannot make a little worse and sell a little cheaper, and the people who consider price only are this man's lawful prey."***

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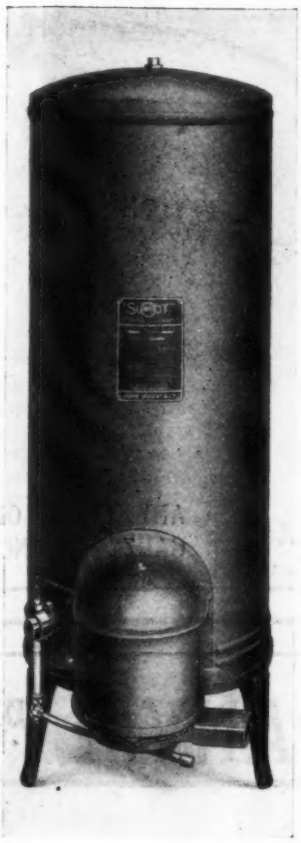

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passing 30 c.ft. of Gas per hour.

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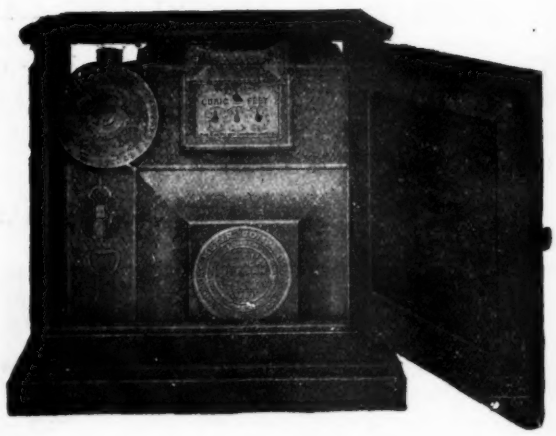
Cabinets supplied in polished mahogany or whitewood finished in any colour to suit surroundings.

May we send you a quotation?



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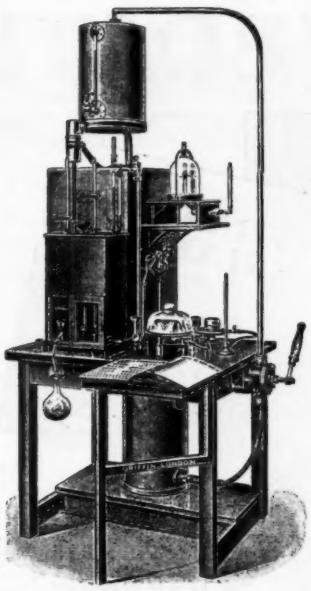

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*Officially approved by the Gas Referees.*
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and at Glasgow, Manchester, Edinburgh, Liverpool.

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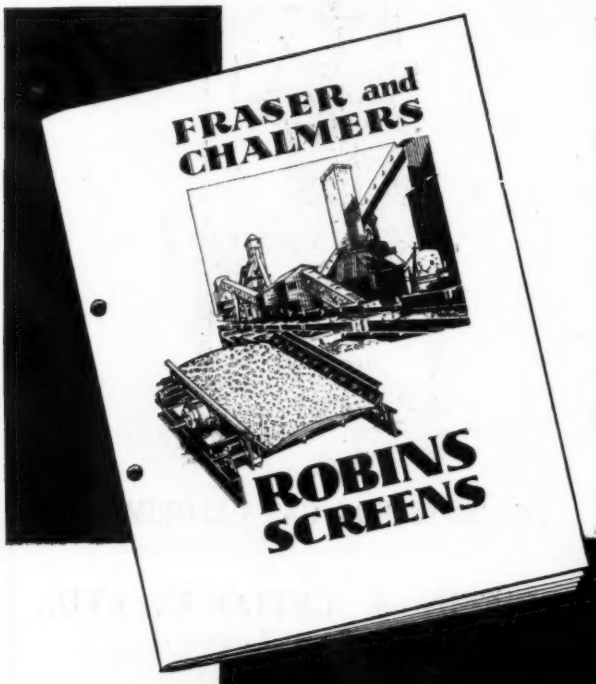


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THE 3 in 1 LUBRICATED "EXCELALL" METER.

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# Alpine New World HOT-TOP Cooking Range

The Disc-bar hotplate, and the flat "Hot-top" contribute to the utmost ease of working and provide a selling feature that ensures the lasting popularity of this fine Davis Range.

comprising: (1) "REGULO" Oven-Heat Controller; (2) ROASTING OVEN of "New World" pattern; (3) "RADO" high efficiency Boiling Burners and "VERTICO" leakproof taps; (4) HOT-TOP — the special feature of this range — with separate Burner; (5) PLATE-OVEN with separate Burner; (6) White porcelain-enamelled BACK-PLATE & SHELF, and (7) BASE and LEGS, making the height just right for cooking in comfort.

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Automatic Charging and Distributing of the Fuel, *without interruption of the gas making process*, eliminates coking labour, increases capacity, and ensures constant conditions of maximum efficiency in tops of generator and carburetter.

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Throughout the history of Water-Gas, Clinkering has been the great bugbear, aggregating per Generator several hours daily of arduous labour, and causing corresponding loss of capacity, waste of fuel, wear and tear on plant and tools, and general disorganization and uncleanliness. All previous attempts to eliminate or ameliorate it having failed, strenuous Hand-Clinkering had come to be regarded as the inherent defect of the Process. Now, however, even with *Carburetted* Water-Gas, *the H. & G. Self-Clinkering and Self-Steaming Generator Completely Eliminates All Clinkering Labour, Tools, Trouble and Expense*, while automatically providing Steam for the Generator. In co-operation with their Automatic Fuel Charger and Distributor, it maintains constant conditions of maximum efficiency throughout the fuel-bed without circulation of cooling water, or waste of heat, water or steam; on the contrary, it conserves for steam production heat formerly lost. It minimizes the carbon in the clinker automatically discharged from the Generator. It achieves perfect distribution of the generator air-blast. It does not require periodical repairs to linings, as in the case of other water-gas generators. *No fire-tools are required; the fuel-bed is never disturbed.*

### Self-Steaming Water-Gas Plant:

By making Waste-Heat Steam Generators a corporate part of H. & G. Water-Gas Generating Plant, the steam for the entire Plant and a surplus for other purposes are produced without cost. Moreover, *in addition to saving all boiler fuel and labour*, these Steam Generators (unlike independently fired boilers) do not require house, setting or chimney, or fuel and ash handling apparatus.

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*H. & G. Safety Automatic Operation* eliminates gas-making labour, substitutes mechanical perfection for human fallibility in the regulation of the operating routine, minimizes the cyclical extremes of temperature in the fuel-bed, improves the fuel and oil efficiencies, and increases the capacity of the Plant—*all while ensuring the Safety of the Process.*

⌑ ⌑ ⌑ ⌑

***(Patents granted or applied for in the various Countries.)***

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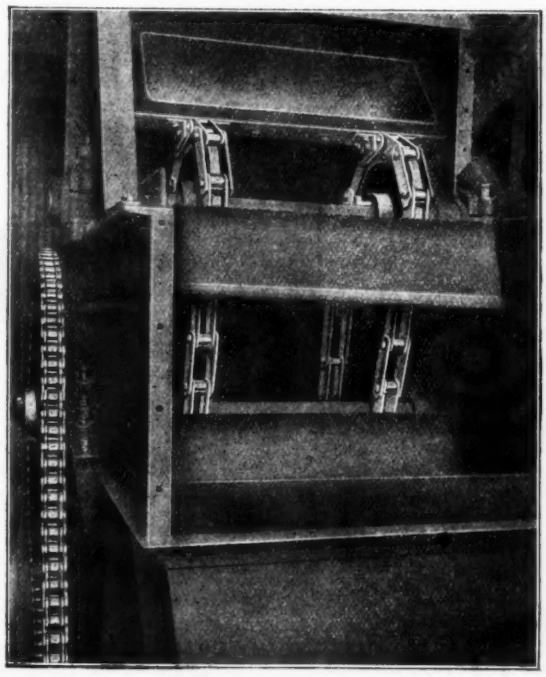

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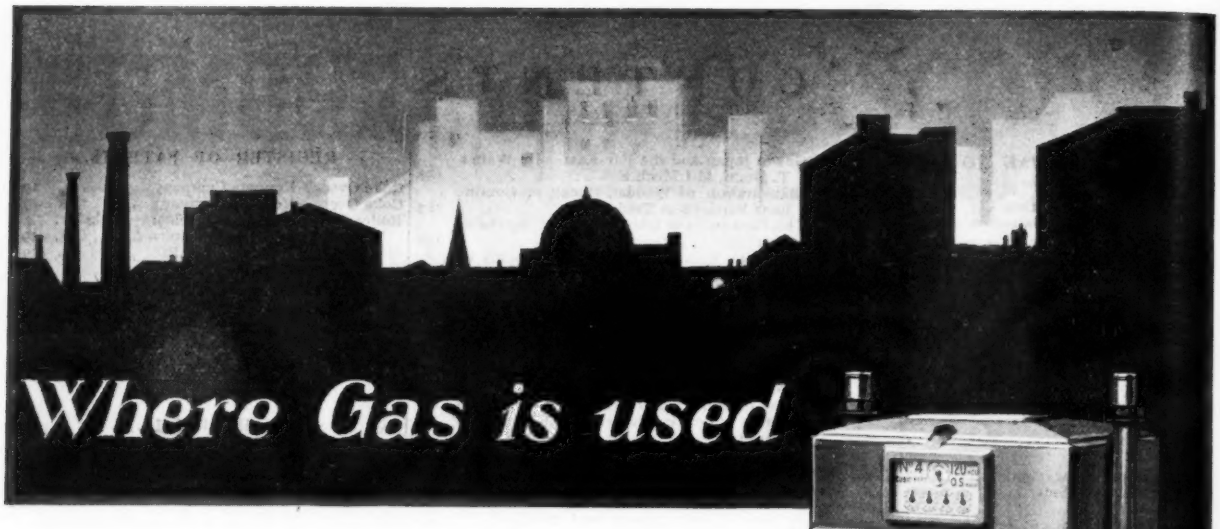

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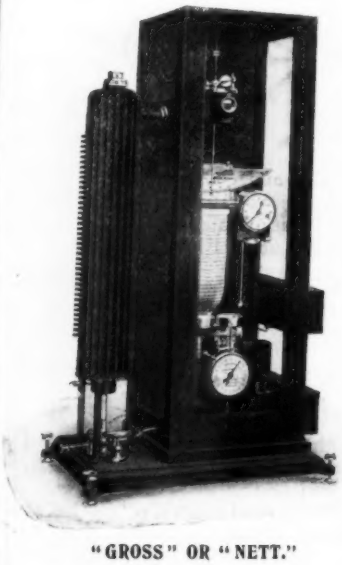

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# Editorial Notes.

## Let Us Be Irritated—

IT is a platitude to-day to say that our industry is being hampered in its development by forced retention of the flat-rate charge for gas. For long it has been unsatisfactory in its working—indeed, ever since the chief competitor of gas as a fuel for domestic and industrial purposes adopted what were all too casually dismissed as "fancy tariffs." In all probability a little less complacency on the part of our industry in the early days of electrical growth would have mitigated, at any rate to some extent, present difficulties. But it is no use carping about what might have been, or joining the ranks of those who, not fully appreciative of the legislative restrictions which have fenced the past but afford no gateway for achieving due progress under modern conditions, belittle the efforts of their own industry to eliminate or modify these very obvious and unfair obstacles to just commercial success.

Time after time, and in sundry places, the position and its ill effects are voiced for the benefit of those within and without the gas industry; and invariably, until such time as the restrictions are dissolved by legislative action, the immediate effect must be one of irritation to those responsible for the progress of gas. This irritation, however, will be all to the good if it results in careful scrutiny of current possibilities and the formulation of new selling schemes; in brief, if it encourages self-reliance. As a whole, the situation is clouded, but it is clear that individual undertakings can do something to bring their methods of charge into closer alignment with modern requirements. To anticipate wholesale success is absurd at present; it is by no means absurd to look for some improvement. The great point is not, despairing, to lie fallow.

The stumbling block to progress in methods of charging for gas is the fallacy that, if the unremunerative consumer is penalized, the customer of small income, who is without any doubt one of the industry's greatest assets, will have to pay more for his gas. The truth is, of course, that the progress of any gas undertaking is reflected in a reduction of the price at which gas can be sold; greater production from the same plant means cheaper production, provided that the sales are in themselves remunerative. And, let it be emphasized, the unremunerative consumer is by no means confined to the poorer classes; the parasite is to be found in every class. We know of comparatively well-to-do consumers who entail a heavy distribution charge yet consume less gas than prepayment customers with half the distribution charge. In other words, the prepayment customer is subsidizing his richer brethren; and we fail to see how this can appeal to the former. It would be idle to suggest that the industry is not concerned about its own prosperity; the point is that it can only prosper through service to its customers, whatever their incomes, and that such service can never be of the highest until the unremunerative consumer becomes a diminishing quantity. When this is a fact, every user of gas will benefit.

## And Exploit this Irritation.

LET us, therefore, not despise the irritation caused by the shackles of legislation drafted in a period when "monopoly" was a word included in the dictionary of our industry. Monopoly, as far as gas in competition with other forms of energy is concerned, has no meaning to-day; competition, on the other hand, means much. "A halfpenny a unit" may have more substance as a phrase than a fact, but it is selling electricity; and while we are awaiting central and local government courage and enlightenment, we must exploit what lies in our power. Two-part, three-part, or four-part tariffs which can be accepted or not according to the customers' desires, can serve as partial remedy to an unpleasant disease. Theoretically, optional schemes suffer the great disadvantage that they are likely to be accepted only by those who will benefit immediately by them, and that there will be difficulty in building-up the group into a substantial majority; further, if any optional scheme has a really good form, some way will have to be found to absorb the temporary loss of revenue that would accrue due to its adoption by those customers who would benefit. Practically, however, these fears are by no means necessarily justified. It is well to quote an example. The optional two-part system introduced at Halifax by Mr. W. B. McLusky is no novelty to our readers. When it was inaugurated, some adopted it, others did not; but its virtue soon became apparent. Those who favoured the scheme very quickly began to consume more gas, for the greater convenience of gaseous fuel was decreed well worth the cost of the extra consumption at a low rate. Experience has proved, Mr. McLusky maintains, that equally large quantities of gas would not have been consumed if the two-part scheme had not been introduced.

There is an attraction about a rate of charge other than the flat-rate basis; we are not concerned whether this is a question of psychology. We feel that Burnley's new system of charging for gas for trade and industrial purposes (this is a four-part system, and was outlined in the "JOURNAL" a fortnight ago) will prove more attractive than a progressive discount scheme; and we believe that much could be done generally by making optional domestic charging methods more attractive; many present rates could be "dressed-up." In his Presi-

dential Address to the North British Association of Gas Managers (see "Journal" for April 16), Mr. David Fulton spoke of the flat-rate system of charging, despite graduated accounts, as being too inflexible, and affirmed that at a reasonable price there is a great volume of business awaiting the industry in the application of gas for central heating. He mentioned that on several occasions the Helensburgh Gas Department has been offered substantial loads for the heating of large residences, but, owing to the flat-rate bugbear, has had no alternative but to refuse them, albeit with the knowledge that such loads would have eventually benefited the poorer consumer.

Because of its constancy, the central heating load is a good one; to our mind, however, the water heating load is an even better one, because it is non-seasonal. And there are available now small-consumption storage appliances which, in certain circumstances, are a most admirable continuous sales outlet for gas. The method of charging for gas for such apparatus could be made more attractive. For instance, in Halifax and in York there is an optional all-in charge of so much per day to cover either the gas consumption alone or the gas and the rent of the appliance. The consumers in those areas are made to realize what gas service they can obtain for 2d. or more per day; and such enterprising, attractive, and clear-cut salesmanship will, we are sure, meet with proper reward.

## Rate Structures and Salesmen's Compensation.

Gas legislation in the United States is, of course, not comparable with that obtaining in this country. The difficulties confronting the development of gas sales in America are not so formidable as those existing at the present time here, but obstacles do exist; and in view of our expressions of opinion in the foregoing articles, it is interesting to turn to what one of the leaders of the American gas industry has to say about the unremunerative customer and how he may be transformed into a sound business proposition. We refer to an address by Mr. Oscar H. Fogg, Vice-President of the Consolidated Gas Company of New York, on later pages of this issue of the "Journal." It is a suggestive address, and it deals in part with the controversial and exceedingly complex problem of salesmen's compensation.

Speaking of the gas industry of America, Mr. Fogg roundly asserts that it is impossible simply to mark off from the books the casual customer who is served at a loss, and limit gas service in one fell swoop to those whom it is profitable to serve. And he turns to more flexible rate forms and to more businesslike compensation of sales effort as a remedy. We do not intend to entangle ourselves in this thorny question of salesmen's compensation, for we feel that, at the moment at any rate, the question cannot possibly be bounded by hard-and-fast rulings; it is more of a domestic matter affecting each particular undertaking than a situation which demands nation-wide standardization. But we think also that it merits nation-wide consideration, for which reason Mr. Fogg's ideas deserve publicity and study.

Salesmanship in the gas industry is so entirely different from ordinary commercial salesmanship that it is impossible to apply current practice in commerce, in regard to salaries and commission, to the selling of gas. A sale of gas is not a sale unless it is enduring, and it is manifestly unfair that the compensation of the industry's sales staff should in any way be penalized for building a satisfactory permanent load instead of a meteoric flash of high intensity which may soon pass. The load of the non-compensating customer is notoriously difficult to build up, and Mr. Fogg maintains that the sales representative who is successful in building-up the load of unremunerative consumers, and carrying them over the line into the class of those who contribute their reasonable share of the net earnings, is entitled to compensation that recognizes the economics of the case. This happy transformation, says Mr. Fogg, can result only through salesmanship and rate forms, through "the development of sounder systems of salesmen's compensation," and outstanding accomplishments should be rewarded, and no limit placed on the earning capacity of the sales representatives.

Salesmen should be paid, states Mr. Fogg, according to the value of the business they secure. Theoretically, of course, everyone will agree with this; but the ideal is so exceedingly difficult to translate into practice. When does a sale begin, and when does it end? And who actually makes the sale; is it the man who steps in at the eleventh hour, and books the order, or is it the man who has for months—maybe for years—prepared the ground by thoroughly hard spade-work? To what extent is the result due to general efficiency of the manufacturing, the distributing, or the secretarial activities of the particular gas undertaking, to the quality of its propaganda, to the continuity of its courtesy? As we said before, we do not propose to reply to these questions; but we do desire to emphasize the general principle that no stone should be left unturned to change the unremunerative consumer into the remunerative class. There must be thousands of border-line cases where the addition of a gas-heated refrigerator, or the small but constant extra load due to a low-consumption water heater, would turn the scales. Concentrated sales effort should certainly be directed on this important current problem.

## Vitality Across the Border.

Last week we commented on a few topics in connection with the Education Scheme of the Institution of Gas Engineers. Our remarks were evoked by the Presidential Address of Mr. David Fulton before the North British Association of Gas Managers, Part I. of which was published in the "Journal" last Wednesday, and Part II. of which will be found on later pages of our issue today. We offer no apology for calling further attention to this stimulating address, the study of which can only be attended by profit.

In the latter part of his address Mr. Fulton describes the growth of the Helensburgh Gas Undertaking, of which he has had charge for the past fifteen years; and it is an interesting story, for several reasons. There is the fact that the sales during his tenure of office as Engineer and Manager have grown rapidly, and, more important still, that a large proportion of this increase has resulted from the greater use of gas per consumer; as far as we are aware, Helensburgh has the largest average consumption per consumer in Scotland. To a certain extent, no doubt, the fact that electricity was introduced into the burgh as recently as 1925 has had some bearing on this happy result; nevertheless, gas at less than 6d. a therm is, we suggest, the main cause. Moreover, much progress is to be traced to the widespread adoption of gaseous heating—a load which electricity will find difficult to assail.

In this respect, however, Mr. Fulton makes observations which are very much to the point. The heating load of the electricity undertakings is attacked through the lighting business; once electric light is installed, electrical salesmanship, wielding the weapon of the halfpenny unit, is not to be ignored. Hence, says Mr. Fulton, watch the lighting. We need systematic maintenance, encouragement of the use of the best type of burner by displays of burners in use, and education of the public; only by such means can we prevent the competitors' lighting wedge from causing breaches in our walls of defence of the cooking and heating load. This is not a new story, but its repetition is necessary.

The Helensburgh Undertaking is meeting competition, and is emerging from the contest creditably. A cheap supply of gas of uniform quality is one part of their armoury; it is the result of enterprise—and enterprise is the other part of their armoury. The central feature of the financial policy, says Mr. Fulton, has always been a conservative course in capital expenditure; but the account which he gives of the undertaking's progress shows that conservatism does not imply lack of enterprise. If particular proof of this be needed, we may mention that vertical retorts of the Glover-West design have been at work since the middle of 1911 as the sole means of gas production. And if particular proof of the efficacy of the Glover-West system of carbonization be needed at this day, Helensburgh provides a bright example.

Until 1927, relates Mr. Fulton, six only of the sixteen retorts had been rebuilt throughout their full length. After fifteen years' work, one setting of eight retorts was reconstructed; this resulted in an increase of 40 p.ct. in the output of the section, and the gaseous yield per ton rose from 77 to 85 therms. Mr. Fulton cites this experience as showing how the reconstruction of older vertical retort plants can delay the expenditure of a large capital sum in extending the number of retorts to cope with a peak load period.

### "Assessment of Gas Undertakings" and the Budget.

We are informed by Mr. H. T. Seymour that the 1930 Budget, as outlined by the Chancellor of the Exchequer on Monday of last week, will not affect the principles of Rating and Income-Tax set out in his book entitled "The Principles and Practice of the Assessment of Gas Undertakings for Imperial and Local Taxation," recently published at the Offices of the "JOURNAL." The only minor amendment necessary will be where the rate of 4s. in the pound is mentioned, and the figure of 4s. 6d. should be substituted. This amendment will, of course, be operative only should the Finance Bill reach the Statute Book in the form indicated by Mr. Snowden. It may be pointed out that in his book Mr. Seymour briefly refers to the Taxation of Land Values; and in view of the proposal for the revaluation of property for the purposes of schedule A assessments, a careful perusal of the chapter dealing with the contentious points as to whether certain property—e.g., showrooms—is part of the hereditament properly assessable under Schedule D on the basis of the profit of the gas undertaking, and not subject to separate assessment, should be found profitable.

### Road Tar and the Coke Oven Industry.

Mr. Philip B. Nicholson, in a paper before the Midland Section of the Coke Oven Managers' Association—see later pages—remarks that the British Road Tar Association is accepted in this country as the body that speaks on behalf of the tar industry as a whole, and "it is to be regretted that lack of support from the coke oven people practically places the control of its policy in the hands of the tar distillers and the gas industry." He suggests that owners of coke oven plants in South Yorkshire should co-operate and form a board which should join the British Road Tar Association. He is of opinion that the board should be entirely free, directly or indirectly, from the gas or tar distilling interests, and that an organization should be formed in order to market coke oven tar under a registered trade mark.

### The Underwriting Scandal.

Accepting people at their own valuation frequently serves to smooth any wrinkles out of social relationships, but it is apt to become expensive when adopted as a policy in connection with monetary transactions. How many shareholders now are regretting their trustfulness in subscribing for shares on the faith of the statement that the capital had been underwritten—the inference drawn by them being that, in any event, the necessary money would be forthcoming to ensure the carrying out by the company of its plans and obligations? Could the figure be calculated, it would probably be found that the losses due to defaulting underwriters last year far exceeded those occasioned by acts of which much more was heard; and it is abundantly clear that precautions should have been taken—as obviously the general public assumed had been done—to see that applicants for shares were properly protected. "Heads I win, and tails you lose" is a too one-sided game for the investor to take part in when he has possibly large sums of hard-earned money at stake. Mr. Henry Morgan, President of the Society of Incorporated Accountants and Auditors, writing in "The Times" Trade and Engineering Supplement, alludes to a legal case in which it appeared that a person who had underwritten £55,000 of an issue had a County Court judgment against him for a debt of £15! The investor has a right to expect better protection than this; and the City will be wise when it sees that he gets it.

### Electricity Charges.

There has been much talk of late about "halfpenny" electricity and it is a subject which closely concerns readers of the "JOURNAL," who may therefore be directed to some paragraphs appearing in this issue under the heading of "On the Electrical Side." The reference is to a supplement just published by the "Electrical Review," consisting of a table of domestic tariffs, giving particulars of undertakings supplying current for heating and cooking at 1d., or under, per KW.-H. When compared with the customary flat rate system of charging for gas, the details contained in this table present much food for thought.

### Substitute Sunshine for Miners.

The value of artificial sunlight (where the real thing is unavailable) is now recognized to be important from a health point of view, but what is as far as we know a new use for it is mentioned by Mr. Floyd W. Parsons in "Industrial Gas," when he mentions the fact that mining companies are now supplying substitute sunshine for their workers. A company in Idaho have fitted up a so-called sunroom with a narrow moving platform that passes through a cabinet equipped with six powerful ultra-violet-ray lamps. After coming out of the mines and taking their shower, the men, before dressing, step on the moving platform and ride through the cabinet. Three one-minute treatments per week are said to be sufficient; and the outfit can easily deal with 400 individuals per hour. This scheme is of high money value to a company, because it reduces the number of colds and other respiratory ailments, thereby cutting-down absenteeism.

### Recognizing Facts.

It would be well if there were more general recognition of the ill-effects of over-taxation upon industry, but understanding of the matter is spreading surely, if slowly. Mr. Robert Watson, of Kilmarnock, showed clear appreciation of the difficulties, when voicing the following, in the course of his Presidential Address to the Scottish Trades Union Congress: "Taxation ought certainly to be lightened for industry. The idea that a Government can make everybody happy out of the public purse would be excellent if we could afford it; but industry fills the purse, and to try to make everybody happy by killing industry, through taxation, simply will not work."

## Forthcoming Engagements.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

**April 26.**—WESTERN JUNIOR GAS ASSOCIATION.—President's Day. Visit to the Weston-super-Mare Gas-Works, and Annual Meeting.

**April 28.**—WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.—Annual General Meeting at Newport.

**May 2.**—NORTH OF ENGLAND GAS MANAGERS' ASSOCIATION.—Annual General Meeting in Newcastle.

**May 2.**—BRITISH COMMERCIAL GAS ASSOCIATION.—Scottish District Conference, Ayr.

**May 9.**—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Visit to Eastbourne.

**May 9.**—BRITISH COMMERCIAL GAS ASSOCIATION.—Midlands District Conference, Malvern.

**May 13.**—BRITISH COMMERCIAL GAS ASSOCIATION.—Executive Committee Meeting, London, 2.30 p.m.

**May 15.**—MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Spring general meeting at Bromsgrove.

**May 16.**—EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.—Spring Meeting at Harwich.

**May 16.**—SOCIETY OF BRITISH GAS INDUSTRIES.—Council meeting in the morning.

**May 16.**—SOCIETY OF BRITISH GAS INDUSTRIES.—Annual General Meeting and Dinner, Hotel Metropole, London.

**May 21.**—BRITISH COMMERCIAL GAS ASSOCIATION.—General Committee Meeting, London, 2.30 p.m.

**May 23.**—BRITISH COMMERCIAL GAS ASSOCIATION.—Lancashire District Conference, Morecambe.

**May 27.**—NATIONAL GAS COUNCIL.—Annual Meeting.

**June 2-5.**—INSTITUTION OF GAS ENGINEERS.—Annual Conference in Leeds.

# On the Electrical Side.

### Penny Current.

There is being at the moment a good deal of attention given to the variegated and complicated tariffs in force for electricity supplied for the several domestic purposes. To the attractive or incomprehensible nature of these tariffs a good deal of that success which electricity has scored is attributed. Certainly the methods of charge in vogue for electricity are far different from the sweet simplicity of the flat-rate system upon which the gas industry has been built up, and they would seem to conform better to modern conditions. At the prices charged for lighting in many (if not most) places, electricity undertakings would find it practically impossible to secure a foothold in the heating or cooking field, so that more or less elaborate tariff schemes have been forced upon them. Until the gas industry is able to follow this example, it is competing on an unequal footing with a keen rival.

### For Heating and Cooking.

The matter of electrical tariffs is therefore one of concern to "Journal" readers, who will consequently find profit in careful study of a table of domestic tariffs published as a special supplement to the issue of the "Electrical Review" dated April 11. In this table there are set out particulars in connection with undertakings supplying energy for heating and cooking at a penny, or less, per kw.-h. The same paper published some five months ago, in a like supplement, details of undertakings making a charge of a halfpenny or under, with or without a fixed charge in addition, and the present supplement is an extension of this. The later list comprises no fewer than 200 names, but of these only about one-fifth rank as having the figure of a halfpenny introduced solely or partially as the secondary charge. About one-quarter of the total have established three-farthings as the secondary charge.

### Primary Charge Basis Varies.

Preceding the secondary charge is a column setting out the annual primary charge basis; and it is here, of course, that any existing complications is come upon. The basis varies fundamentally in different cases, but often it is simple enough. For example, the Worcester Corporation head the list with 0·45d. per kw.-h. unconditional as a secondary charge; the primary charge being 18 p.ct. on rateable value. Liverpool is placed under the 0·5d. rate; but a figure is quoted of 0·3d. for water above 500 kw.-h. per quarter. Then there is the Stoke-on-Trent Corporation, with a primary charge of £1 per assessed room, and a secondary charge of 1d. for 240 kw.-h. per quarter, and 0·375d. in excess of this. Some rateable value charges have a minimum attached to them. The Bolton Corporation, with a secondary charge of 0·5d. per kw.-h., have a primary charge of 4½d. per kw.-h. for a defined number of kw.-h. per room. In some instances there is a primary charge of so much per room, in others the basis is floor area, and in others again a fixed charge is levied. In Poplar with a secondary charge of 0·75d. per kw.-h. the primary charge is 8½ p.ct. on cost of service and installation and 12s. per kw. of cookers and heaters. Several undertakings base their primary charge on the number of points or lamps.

Another column of the table which catches the eye is that giving the price of gas in pence per therm prevailing in the districts referred to. The secondary charge for current is, of course, not the only figure to be considered in regard to a supply of electricity for domestic heating or cooking, but leaving out of account the primary charge it will be seen that the price of gas per therm is by no means necessarily the cheapest where the secondary charge for electricity is the lowest. This, however, is "another story."

### A New Sensation.

Diners in public, if they wish to avoid sudden shocks, may find it necessary to be rigidly abstemious. The arrival is announced of an electrical projector which provides kaleidoscopic and pictorial effects, and is applicable to numerous advertising and other purposes. Its application to outside advertising may do something to brighten the path of the wayfarer, and to irritate the nerves of those who would fain enjoy peace; but it is the internal application of this novel appliance which has most impressed us. Here is a picture drawn: "The use of these projectors enables restaurant scenic effects to be changed; thus from 6 to 9 p.m. the room may resemble a Venetian hall, from 9 to 11 p.m. a Louis ballroom, and from 11 p.m. to 2 a.m. jazz decoration can be brought into effect." Imagine the visitor who had dined not wisely but too well nodding at 8.59 p.m. in a Venetian hall, and awakening at 9.1 p.m. to find himself in a Louis ballroom! What would be the likely effect upon the mind of the wanderer? Really, our electrical friends should be more considerate!

### The Land of Promise.

Industry is hardly likely to welcome the Budget, which is studded with hard facts for the direct taxpayer as liberally as is the top of a Dundee cake with almonds. More from this pocket; more from that. All expedients sounded, but that of economy—a word which may well disappear from future dictionaries. There must be a stage at which the imposition of further taxation would prove a failure even from a revenue-producing point of view, apart altogether from any broader aspects; but it is to be hoped that this stage will never be reached. Meanwhile, in some respects life may be expected to be a little harder than before, and anything which may hold out promise of improvement will be more than ever welcome. There may be anticipated, therefore, a boosting with re-doubled vigour of electricity, about which those in authority never tire of telling us. Quite recently at Derby Mr. Thomas declared that it was impossible to compute the benefits which mankind derived from the use of electricity. On the same occasion, Mr. Frank Hodges, speaking as a member of the Central Electricity Board, said that six schemes had been passed, and another was under consideration. When they became operative, 90 p.ct. of the population, and 94 p.ct. of the acreage of the country, would be covered. Industry, bowed down with the weight of taxation, must wonder whether this will prove to be the Promised Land.

### Another Transformation.

We are doubtful whether motor drivers will hail with delight a report now current that a scheme is under consideration which will transform Trafalgar Square into a miniature garden, which at night will be flooded with light. An application has, it is said, been made for permission to construct a generating station under the square; a condition being the free lighting of the Square itself on such a scale as to "make it an oasis of brilliance by comparison with the illumination of surrounding streets." This is not exactly the method of public lighting that experts have declared themselves in favour of. There are, however, to be seats and "shrubs in pots," so that even if the Square is shunned by drivers, the taxpayer, when no longer in a position to afford a garden of his own, will be able to go there and sit among "sylvan" surroundings while he studies his income-tax form.

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**Coal for Dundee Gas-Works.**—Offers of coal for the gas-works for the ensuing year were under consideration at a meeting of the Gas Sub-Committee of Dundee Town Council on April 10. The Committee recommended the acceptance of offers for approximately 90,000 tons, at an average cost of 19s. 8·61d. per ton, as against 19s. 7·39d. last year—an increase of 1·22d. per ton.

**Cookery Demonstrations at Elland.**—The lectures and practical cookery demonstrations held in the Constitutional Hall, Elland, under the auspices of the Elland-cum-Greetland Gas Company, concluded on April 5 after a successful week. Miss E. Eccles, C.D.S., first-class diplomée, Board of Education, was the lecturer, and her addresses and demonstrations were much enjoyed by a large number of ladies. The lectures were well attended throughout the week, and on the final Saturday night there were over 70 present. A good selection of modern appliances was on view, including gas cookers, gas fires, and boilers.

**Purchase of Blyth Undertaking.**—The Blyth Town Council have appointed a Sub-Committee to go into the question of acquiring the Blyth Gas Company's undertaking, with power to engage an expert adviser if necessary.

**Long-Service Rewards for Walsall Employees.**—Ten employees of the Walsall Corporation Gas Undertaking, who are retiring on pension, were recently presented with framed certificates of merit. They are A. Kerk (48 years' service), T. Horan (40), W. Ellison (39), D. Jennings (39), T. Greenhough (38), T. Hall (37), T. Myring (33), G. Latham (29), W. Neville (29), and J. Whitehouse (29). Councillor J. Leckie, the Chairman of the Gas Committee, entertained the pensioners at tea and made the presentations. The pensions scheme, on a non-contributory basis, he said, gave a maximum pension of £1 per week, and he hoped that other Corporation Departments would follow their example. Councillor Leckie said that there were now 37 pensioners of the Gas Undertaking with an average of 36 years' service, and an average age of 71½ years.

# In To-Day's "Journal."

### The Helensburgh Gas Undertaking.

Part II. of Mr. David Fulton's Presidential Address before the North British Association of Gas Managers takes the form of a history of gas progress in Helensburgh from the time of its first introduction in 1844. The Undertaking was acquired by the Town Council in 1899 at a price of £31,115, and the quantity of gas then manufactured was 44 million c.ft. An interesting and unusual feature in the history of the undertaking was that in 1925 a Provisional Order was successfully promoted which closed a public highway to permit extensions of the gas-works. "It is with a sense of almost surprise one realizes," says Mr. Fulton, "that the Glover-West vertical retort plant has been at work since the middle of 1911, and that it will be twenty years' old next year. The courage and enterprise of my predecessor, the late Mr. William Blair, and his Gas Committee, cannot be too strongly commended. In those days it was considered almost foolhardy for anyone to adopt vertical retorts as the sole means of producing gas."

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### Economics of Load Building.

Increase in gas service on an economic basis, says Mr. Oscar H. Fogg, Vice-President of the Consolidated Gas Company of New York, in an article on later pages, can result only through salesmanship. The ability and energy of the sales representatives are to be recognized to the utmost. Outstanding accomplishments should be rewarded and no limit placed on earning capacity of the sales representatives. If our compensation system is sound, the higher their earnings the happier everyone will be—including the stockholders. Here, in at least three of the essentials of building the load on an economic basis—that is (*a*) in the expenditure of money to secure business; (*b*) in the development of rate forms designed to secure business under the competitive conditions that now prevail; and (*c*) in the development of sounder systems of salesmen's compensation—it would appear that readjustment could be made in each to approach more closely the requirement that is of the greatest practical importance, and that is, "what is it worth to us?" In a few words, spend most to get the most valuable business; give to each class of business (or use) the best rate its value can earn; and pay sales representatives according to the value of the business they secure.

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### Gas in Japan and in the Far East.

The progress of gas in Japan during the last half-century makes an interesting study, and Mr. Walter T. Dunn deals with the subject in a comprehensive manner in a paper before the Junior Institution of Engineers. The present consumption of gas in the Island Empire is about 17,284,500,000 c.ft., which shows that the average consumption per house has been almost doubled during the last fourteen years or so. There can be no question, says Mr. Dunn, that the Japanese gas industry is in a flourishing and stable condition.

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### Road Tar.

How to increase the sales of coke oven tar for road-making and surfacing purposes is the subject discussed by Mr. Philip B. Nicholson. He suggests that the coke oven interests in this country should take a leaf out of the book of the leading coke oven tar firm in the United States, whose success has been brought about by: (1) Developments of grades of tar to meet practically every system of highway construction and maintenance; each specification is rigid in its requirements and is within a narrow range of prescribed limits, which tends to uniformity and can therefore be expected to give good results. (2) Under the heading of service, skilled engineers are available for consultation by surveyors, with reference to their road problems. (3) Advertisement is practised on an extensive scale, the products having a registered trade mark. (4) Distribution is carried out by modern methods which not only save local authorities a considerable amount of money, but, at the same time, save the surveyor much trouble.

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### Tar Dehydration and Distillation on a 360-Million Works.

Mr. J. M. Dow, of Perth, describes, in a paper before the Scottish Junior Gas Association (Eastern District), a 30-ton per diem Wikner patent dehydrator at the Perth Gas-Works. This plant was installed fully six years ago, being one of the very first introduced in Scotland. Some interesting tables are given on the results of the plant and also on the results of distillation processes. Keeping in mind the fact that their source of coal supply is drawn over a wide area, and that it is the gas yield that is of primary importance, they at Perth have endeavoured to stabilize their distillation factors by concentrating on time distillation. This is greatly facilitated, states Mr. Dow, by using dehydrated tar.

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### Progress in Coke Research.

The annual report is published of the Northern Coke Research Committee. It outlines some of the more important results which have been obtained in the Coke Research Laboratory, at Armstrong College, and at various works, during the year ended Dec. 31, 1929. The report concludes by stating that, although since its formation the Committee has given much information as to variations in the quality of coke which may result from variations in carbonizing conditions, the general trend of the research is to show that a knowledge of the intrinsic carbonizing properties of the coal is of primary importance. The blending experiments have shown that the addition of quite small quantities of inferior coking coal produces a more than proportionate lowering in the quality of the coke, and, as the majority of coke ovens and gas-works are carbonizing coals which are in themselves almost invariably blends, and as coals are blended for expert purposes, a knowledge of the fundamental principles involved in the practice of blending is of the utmost importance to the whole industry. For these reasons the blending programme is being actively pursued.

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### National Illumination Committee of Great Britain.

An extract is published from the Report of the Chairman of this Committee (Lieut.-Col. Kenelm Edgcumbe) for the year 1929. The principal activities of the Committee during the past year have been in connection with the carrying-out of the programe of work decided upon by the International Commission on Illumination at the Bellagio and Saranac meetings, and with the preliminary preparations for the 1931 meeting of the Commission, which is to be held in England.

## Personal.

In last week's "Journal" mention was made of the appointment of Mr. R. C. Taylor to the post of Assistant Engineer to the Portsmouth Gas Company. Educated at the Leeds Modern School, Mr. Taylor, who is now 34 years of age, commenced his business career in 1912 as a pupil to Messrs. J. Nicholson, Chemical Works, Leeds, where he remained till the outbreak of war in 1914. During the whole of the war he served with the 15th West Yorkshire Regiment in Egypt, Belgium, and France, and was awarded the Military Medal. During 1918-19 he was at the Lille University, investigating the position of ammonium salts made synthetically—on which subject he read a paper before the North of England Gas Managers' Association in 1923. In 1919 he commenced a Degree course in the Department of Coal Gas and Fuel Industries, being awarded the Degree of B.Sc. (Gas Engineering) in 1922, in which year he was appointed Assistant Engineer and Manager to the Bridlington Gas Company. In 1925 he was appointed Deputy Gas Engineer to the Singapore Municipality, and at the time of his appointment to Portsmouth was in England on leave from the Straits Settlement. Mr. Taylor is a Member of the Institution of Gas Engineers and an Associate Member of the Institution of Mechanical Engineers.

Mr. W. Clarke Jackson, Gas Engineer and Manager of the Neath Corporation Gas Department, and first President of the Neath Rotary Club, was presented on April 14 at the Rotary luncheon with the founder President's Jewel. The present President, Councillor Herbert Waring, a member of the Neath Gas Committee, made the presentation. He referred not only to Mr. Jackson's successful presidential year, but also to his efficiency as Gas Engineer and Manager to the Corporation. He spoke highly of the invaluable service rendered to the town by Mr. Jackson, and said that Mr. Jackson was admirably carrying out the Rotarian ideal of service.

Mr. Arthur T. Sinclair, Works Chemist and General Assistant at Lochgreen Gas-Works, Greenock, has been appointed Manager at Campbeltown. Mr. Sinclair was a member of the Committee of the Scottish Junior Gas Association (Western District) for four years.

At a meeting of the Board of Directors of the Consumers' Gas Company, Toronto, Mr. Arthur Hewitt, who is well known to our readers, was elected to succeed the late Dr. F. Le M. Grasett as Vice-President of the Company.

# Commercial and Industrial.

## Stock Market Report.

**[For Stock and Share List, see later page.]**

Business on the Stock Exchange during the early part of last week was naturally affected by the Budget statement; but prices in most markets remained comparatively steady, with a revival of interest towards the close on Thursday.

The Gas Market continued to show signs of recovery, and, though the volume of business was somewhat restricted, values were in many cases above those of the previous week. Among ordinary stocks to show improvement were the South Suburban 5 p.ct., which increased 2 points to 101½; Wandsworth consolidated with a rise of 1 point to 110½; and (at the local Exchange) Liverpool 5 p.ct. gained 1¼ points to 91¼. Among debentures, Tottenham 4 p.ct. rose 3 points to 74½, and South Metropolitan 6½ p.ct. 1 point to par. The latter stock is redeemable at par on Sept. 15, 1931.

The report and accounts of the Primitiva Gas Company have been received, and will doubtless give the shareholders every cause for satisfaction. The profit and loss account shows a balance of £246,721, against £222,521 for 1928. The dividend recommended is 1s. 3d. per share (against 1s. last year), and, after allowing for this and allocations to depreciation and renewals account and contingencies reserve (the latter allocation increased from £10,000 to £25,000), the carry-forward is £58,040, against £56,605. It will be remembered that this Company has entered into an arrangement with the Cia Hispano-Americana de Electricidad for co-operative working, and has formed a holding Company into which the Primitiva shareholders have been asked to exchange their shares, which, together with 660,000 shares sold to the "C.H.A.D.E.," will be held by two trustees, who will be responsible for using their votes to maintain British control. The report states that so far 2,221,416 shares, or nearly 95 p.ct. of the number available, have been exchanged.

The Directors of the Bombay Company are recommending a final dividend of 4 p.ct. (*less* tax), making 7½ p.ct. for the year, against 7 p.ct. for 1928.

## Trade Notes.

**The "Universal" Coal Dryer.**

Messrs. The Brightside Foundry and Engineering Company, Ltd., of Sheffield, have recently acquired from Messrs. Universal Dryers Company, Ltd., of Barnsley, the sole manufacturing and selling rights for Great Britain for the "Universal" coal dryer. A special department dealing with this machine has been inaugurated under the control of Mr. R. V. Farnham, M.I.Mech.E., who is well versed in the subject of abstracting moisture from coal by thermal means.

**Ewart's "Emperor" Smoke Cure.**

Messrs. A. Ling & Co., Ltd., of 138, Fetter Lane, E.C. 4, have issued an interesting booklet on Ewart's "Emperor" Smoke Cure—a new and efficient type of revolving cowl which is claimed to prevent downdraught in chimneys. It is constructed on scientific lines with a rotating head, to which are fitted blades of a special design against which the wind acts to cause very rapid rotation. The cowl is made of selected material, and enamelled with special preservative enamel.

**Monel Metal and Malleable Nickel.**

Messrs. Monel-Weir, Ltd., of Cathcart, Glasgow, have published a full list of the uses of malleable nickel and monel metal, of which latter product they are the sole concessionaires in Great Britain. This list of definitely established uses of monel metal in the process industries is the result of years of experience, and should serve as a very useful guide for those who are so constantly investigating the possibilities of modern metals and their applications in metallurgical, chemical, and physical problems.

**New Gas Plant for Edinburgh.**

Acceptance has been recommended by the Gas Committee of Edinburgh Town Council of the tender by the Woodall-Duckham Vertical Retort and Ovens Construction Company for new plant at the Granton Gas-Works. The price is £148,514, and the plant will have a capacity for dealing with 533 tons of coal daily. This is one of the schemes recently approved of by the Town Council for providing work, and will receive a grant from the Treasury. The work is to be completed within 15 months from its start, and the commencement must be made within four months of the signing of the contract.

**"Micox" Electric Drills.**

A new folder has recently been issued by Bell's Asbestos and Engineering Supplies, Ltd., of 157, Queen Victoria Street, E.C. 4, giving particulars of "Micox" electric drills, which they are marketing. The makers state that it is impossible to cause these drills to stall. In order to test this out the firm took a ½-in. "Micox" drill fitted with a ⅜-in. carbon steel drill into their works recently. The ⅜-in. drill was put into a vice, and they jammed the "Micox" itself, and then turned on the current. The ⅜-in. carbon drill immediately flew into fragments, although they allowed no slack in the machine to enable it to get up momentum before suddenly applying a torque to the drill.

## Contracts Open.

**Gasholder and Foundations.**

The Southport Gas Committee invite tenders for a waterless gasholder and foundations. [See advert. on p. 204.]

## Current Sales of Gas Products.

**The London Market for Tar, Tar Products, and Sulphate.**

London, *April 22.*

Prices of tar products remain unchanged.

Creosote for export is 6d. to 6¼d. per gallon f.o.b.

Pitch is 47s. 6d. per ton f.o.b.

Pure toluole is 2s. 5d. to 2s. 6d.; solvent naphtha, 95/160, about 1s. 5d.; pure benzole, about 1s. 11d.; and pyridine bases, 3s. 9d.—all per gallon.

**Tar Products in the Provinces.**

*April 22.*

The average prices of gas-works products during the week were: Gas-works tar, 21s. to 26s. Pitch—East Coast, 46s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 46s. f.o.b.* Toluole, naked, North, 1s. 7¼d. to 1s. 8¼d. Coal-tar crude naphtha, in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 3d. to 1s. 3½d. Heavy naphtha, North, 1s. to 1s. 0½d. Creosote, in bulk, North, liquid and salty, 3½d. to 3⅝d.; low gravity, 1¼d. to 1½d.; Scotland, 3½d. to 3⅝d. Heavy oils, in bulk, North, 5½d. to 6d. Carbolic acid, 60's, 2s. 4d. to 2s. 5d. prompt. Naphthalene, £12 to £14. Salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum, 40 p.ct., purely nominal; "B" quality, unsaleable.

* It is proposed in future to quote all prices for pitch on the basis of f.o.b. In order to arrive at the f.a.s. value at any port, it will be necessary to deduct the loading costs and the tolls whatever they may be.

**Tar Products in Scotland.**

Glasgow, *April 19.*

There is very little interest being taken in tar products at the present time. Refined tar is disappointing; but it is considered in well-informed circles that this is merely a temporary state. The prices of other products are unchanged.

Pitch.—The value is nominal at 47s. 6d. to 50s. per ton f.a.s. Glasgow for export. Home orders command about 50s. per ton *ex* works.

Tar.—While several makers are firm in their ideas some orders have been placed at the equivalent of about 3⅝d. to 4¼d. per gallon f.o.r. works in buyers' packages, which is a reduction on previous prices.

Creosote.—B.E.S.A. specification is 3½d. to 4d. per gallon; low gravity, 3d. to 3½d. per gallon; neutral oil, 3d. to 3½d. per gallon—all f.o.r. makers' works.

Cresylic.—The market is unchanged, quotations being steady. Pale 97/99 p.ct. is 1s. 8¾d. to 1s. 9¾d. per gallon; dark 97/99 p.ct., 1s. 7¼d. to 1s. 8¼d. per gallon; pale, 99/100 p.ct., 1s. 11½d. to 2s. 0½d. per gallon—all f.o.r. works.

Crude naphtha is easy in tone at 4¾d. to 5¼d. per gallon free on rails works.

Solvent Naphtha.—There are very few orders in the market. 90/160 is 1s. 2½d. to 1s. 3½d. per gallon, and 90/190, 1s. to 1s. 1d. per gallon.

Motor Benzole.—There is a good demand, and business is being done at 1s. 6d. to 1s. 6½d. per gallon *ex* works.

Pyridines are lifeless; 90/160 grade is about 3s. 3d. to 3s. 6d. per gallon.

**Benzole Prices.**

The following are considered to be the market prices at the present time:

| | s. d. | s. d. | |
|---|---|---|---|
| Crude benzole . . . | 0 10 to | 0 11 | per gallon at works |
| Motor ,, . . . | 1 5½ ,, | 1 6½ ,, | ,, ,, |
| Pure ,, . . . | 1 10 ,, | 1 11 ,, | ,, ,, |

## Overseas Opportunities.

**[From the Board of Trade Journal.]**

**South Africa.**

*Steel (or Concrete) Lighting Poles.*—H.M. Trade Commissioner at Johannesburg reports that the City of Johannesburg is calling for tenders, to be presented in South Africa by May 1, 1930, for the supply of 250 35-ft. and 1000 30-ft. steel lighting poles, complete with cap finials, &c. Alternative tenders for approved concrete poles will be considered. (Contract No. 368.) Firms desirous of offering poles of British manufacture can obtain further particulars of this call for tenders upon application to the Department of Overseas Trade, 35, Old Queen Street, S.W. 1. (Ref. A.X. 9390.)

**U.S.A.**

*Lapwelded Steel Pipes and Butt-Welded W.I. Galvanized and Black Tubes.*—H.M. Consul at San Francisco reports that a local firm are desirous of receiving quotations from British firms for the supply of butt-welded wrought-iron galvanized and black tubes in sizes from ¼ in. to 2 in., with couplings, to American Standard Specifications, and must be supplied with American threads in random lengths of not less than 20 ft. Firms desirous of offering tubes of British manufacture can obtain further particulars of this inquiry upon application to the Department of Overseas Trade, 35, Old Queen Street, S.W. 1. (Ref. A.X. 9382.)

# Topical Items.

## Correct Designations of Members of the Institution of Gas Engineers.

At a meeting of the Council of the Institution of Gas Engineers on April 9, the Secretary was instructed to draw the attention of Members to the following By-law, in order that Members shall be aware of their correct designations under the recently granted Royal Charter:

BY-LAW 9.

9. (*a*) An Honorary Life Member shall be entitled to the exclusive use after his name of the initials "Hon.Life M.Inst.Gas E.;" an Honorary Member of the initials "Hon.M.Inst.Gas E.;" a Member of the initials "M.Inst.Gas E.;" an Associate Member of the initials "Assoc.M.Inst.Gas E.;" an Associate of the initials "Assoc.Inst.Gas E.;" and a Student of the initials "Stud.Inst.Gas E."

(*b*) Every Member and Associate Member is, and is entitled to describe himself as, a Chartered Gas Engineer, and in using that description after his name shall place it after the designation of the class in the Institution to which he belongs, stated in accordance with the following abbreviated forms—namely, M.Inst.Gas E. or Assoc.M.Inst.Gas E., as the case may be.

(*c*) A Member or Associate Member practising

(i.) under the title of, or as an officer or employee of, a limited company authorized to carry on the business of a gas engineer in all or any of its branches or

(ii.) in partnership with any person who is not a Member or Associate Member of the Institution under the title of a firm,

shall not use or permit to be used after the title of any such company or firm the designation "Chartered Gas Engineer" or "Chartered Gas Engineers," or describe or permit the description of such company or firm in any way as "Chartered Gas Engineer" or "Chartered Gas Engineers."

(*d*) No person shall adopt or describe himself by any other description or abbreviation to indicate the class to which he belongs than is provided in this by-law for such class.

## Yorkshire Juniors Visit Low-Temperature Carbonisation Works at Askern.

Members of the Yorkshire Junior Gas Association, to the number of over 80, spent an interesting day on April 12, when they visited the Coalite Works of Low-Temperature Carbonisation, Ltd., at Askern, near Doncaster. The visitors were welcomed by Mr. Green, Works Manager, and members of his staff, who constituted themselves guides for the inspection of the plant.

Mr. Green first explained the process of low-temperature carbonization as carried out at Askern, and the members were then conducted over the works to see the various stages of the process in operation. The fuel produced at these works is the now well-known "Coalite," yielded by heating washed small coal to a temperature of 600° C. Prior to carbonization the coal is dried by means of the waste gases from the settings. The retorts are set vertically and consist of twelve tubes cast *en bloc* with common head and base, the tube being designed particularly to expose the maximum area to the heating medium. From the retort the "Coalite" falls into a cooling chamber, and from there by means of conveyors to the vibratory screens.

The gas obtained is used for heating the retort settings, and any excess is consumed under the boilers. The gas passing from the retorts is treated in an electrostatic deposition plant for the complete removal of tar, and goes through acid bubbler, condenser, exhauster, and scrubber to the holder. The works are admirably laid out, and, being situated at the pit-head, handling of the coal is reduced to a minimum.

The visitors were particularly interested in the carbonizing plant, the electrostatic deposition plant, and the distillation plant for the recovery of crude motor spirit.

At the conclusion of the inspection of the works the party were entertained at tea by the Company, at the Railway Hotel, A hearty vote of thanks was awarded the Company and Mr. Green, on the motion of Mr. F. Firth, A.I.C., President of the Association and Chief Chemist to the Leeds Corporation Gas Department, seconded by Mr. E. Crowther, Deputy-Engineer and Manager to the Bradford Corporation Gas Department.

Mr. Green suitably responded.

## B.C.G.A. District Conferences.

### Scottish District.

The following is the programme of the Scottish District Conference of the British Commercial Gas Association, which will be held in the Town Hall, Ayr, on Friday, May 2. Mr. J. M. Goodwin will preside.

MORNING SESSION.

10.30 a.m. Welcome by the Provost, Mr. J. S. Stewart.

Opening Address by the President of the Conference.

Discussion on "Gas—the Modern Fuel in Home and Industry." To be opened by Mr. F. W. Goodenough, C.B.E (Executive Chairman British Commercial Gas Association) followed by Mr. T. W. Harper (Ayr), Mr. J. W. McLusky (Glasgow), Mr. D. Fulton (Helensburgh), Mr. H. H. Gracie (Edinburgh), and others.

12.45 p.m. Adjournment for luncheon at Town Hall, presided over by Mr. T. Frew (Vice-Chairman, the Newton-on-Ayr Gas Company, Ltd.).

AFTERNOON SESSION.

2.30 p.m. Public Conference.

Opening remarks by the President of the Conference.

Subjects for discussion: (1) "Health and Hygiene," by Dr. W. F. Brown, M.B., D.P.H. (Medical Officer of Health for Ayr). (2) "The Gas Industry's Contribution to Public Health," by Mr. Peter Fyfe (late Director of Housing, City of Glasgow).

Discussion to be opened by Ex-Bailie Alex. Munro (Convener, City of Glasgow Gas Department), followed by Councillor J. Rankine Andrew, Mr. F. W. Goodenough, C.B.E., and others.

4.30 p.m. Tea.

### Midlands District.

The following is the programme of the Midlands District Conference of the British Commercial Gas Association, which will be held in the Council Chamber, Council House, Malvern, on Friday, May 9. Councillor E. Lloyd Morris will preside.

MORNING SESSION.

10.30 a.m. Official welcome by the Chairman of the Malvern Urban District Council, Councillor William Sayers, J.P.

Opening Address by the President of the Conference.

Discussion on "Gas—the Modern Fuel in Home and Industry." To be opened by Mr. E. D. Wootten (Engineer and Manager, Malvern Urban District Council Gas and Electricity Department), followed by Mr. A. W. Smith (General Manager, City of Birmingham Gas Department), Mr. P. N. Langford (Engineer and Manager, Coventry Corporation Gas Department), Mr. F. C. Briggs, A.M.Inst.C.E., M.I.Mech.E., M.Inst.Chem.E. (Engineer and General Manager, Town of Dudley Gas Light Company), Mr. R. S. Ramsden (Engineer and Manager, Leamington Priors Gas Company), and others.

12.45 p.m. Adjournment for luncheon.

AFTERNOON SESSION.

3.0 p.m. In the Winter Garden, Malvern.

A Public Lecture, entitled "Sunlight and Health," by Dr. C. W. Saleeby, F.R.S. (Edin.), Chairman of the Sunlight League.

Opening remarks by the President of the Conference.

Visitors are cordially invited to inspect the exhibition of modern gas appliances in the Priory Small Hall, Priory Park, Malvern.

## Gas Explosion in Broadway, New York.

A leaking gas main in the great conduit sewer under Broadway blew up twelve manhole covers at the intersection of Broadway and Twenty-Ninth and Thirtieth Streets just before noon on April 3, slightly injuring six persons, driving several thousand out of offices between Twenty-Seventh and Thirty-Third Streets in fear of more severe blasts, severing 40,000 telephone lines, and interrupting electric light and power service in the neighbourhood, and traffic lights many blocks away. Traffic was roped off for several hours while gas company emergency crews tried to plug the leaking pipe, states "The Sun."

Shortly before three o'clock workmen found the break in the 6-in. gas main which had flooded the sewer with gas. It was a 4-in. break, probably at a point where the pipe had previously been repaired. It was quickly plugged and the flow of gas stopped, although pockets of gas were thought still to exist in the sewer, and manhole covers for several blocks were left open to "air out" the sewer. Street cars were allowed to run through the area at about 2.45, though other traffic was still diverted round the district. The gas supply was resumed in the evening.

## Centralization Scheme Approved at Barrow.

A special meeting of the Barrow Town Council was held on April 15—the Mayor (Ald. J. Whinnerah, J.P.) presiding—for the purpose of considering the proposed centralization of the Borough's gas-works at Salthouse.

The Council first discussed the matter in committee, and on going into open meeting again, Councillor Holland, Chairman of the Gas and Water Committee, moved the adoption of the scheme for the centralization of the plant at Salthouse. This was seconded by Alderman Tyson, and unanimously approved. The official outline of the scheme adopted states that the question of a new gas-works was under consideration by the Council before the war, and the commencement of the Salthouse gas-works was made in the early stages of the war. The plant generally was erected to cope with the full requirements of the undertaking, with the exception of the carbonizing plant. The Hindpool Road Works, being the elder works, have been working for a great number of years, and are now in such a condition as to be beyond economic repair. The Council inspected these works on March 6, 1928, and it was decided that the question of a new carbonizing plant should be gone into forthwith. A deputation from the Gas Committee visited various works in order to see the most up-to-date methods of carbonizing, and they unanimously recommended to the Gas Committee the adoption of the present scheme. This comprises a new retort house containing ten beds of retorts, eight beds to be filled, and two left for future development. The scheme generally and the drawings were submitted to the Town Council when it was unanimously decided that the contract be placed with Messrs. Drakes, Ltd., Halifax, at a cost of £40,629, and application will be made to the Ministry of Health for the sum of £47,100, the difference between these two amounts to cover the auxilliary work connected with the scheme generally.

## Society of British Gas Industries.

### Council Meeting.

The monthly meeting of the Council of the Society of British Gas Industries was held at 56, Victoria Street, Westminster, on April 10—Mr. C. A. GOODALL, Chairman, presiding. Those present were Mr. Frank West (Vice-Chairman), Dr. E. W. Smith (Hon. Treasurer), Col. E. A. Wilson, Major Richard Miles, Messrs. G. J. Jackson, A. B. Balmford, C. R. F. Threlfall, J. W. Scott, George Clark, R. B. Hodgson, F. J. Gould, G. Ewart, Ernest West, H. E. Bennet, D. M. Gibb, R. J. Milbourne, E. J. Davison (Hon. Secretary), and A. L. Griffith (Secretary). Apologies for absence were reported from Messrs. H. M. Thornton, E. J. Fox, B. B. Waller, and S. Cutler.

The Chairman reported with regret the death of the following members:

James W. Slack, Vice-Chairman and Managing Director, Richmonds Gas Stove Company, Ltd.,

Col. David Laidlaw, Chairman, of Messrs. R. Laidlaw & Son (Edinburgh), Ltd.,

and reported that letters of sympathy had been sent. The members stood as a mark of respect.

An application for membership was submitted from British Petroleum Company, Ltd., London, and they were elected members of the Society under Section VIII.

A contribution of threee guineas was voted to the central office maintenance fund of the British National Committee of the World Power Conference.

Mr. R. J. Milbourne was re-elected the Society's representative on the British National Committee.

The Chairman reported the resolution passed by the Gas Industries Section Committee on March 12 recommending the formation of a Committee to take over all the arrangements for a Gas Industries Section at the 1931 British Industries Fair. It was resolved that the Society again arrange a Gas Industries Section at the Birmingham Fair, 1931, and invite the other bodies to co-operate. The Society's representatives on the Committee were appointed.

A letter was read from the Hon. Secretary of the Joint Gas Conference recommending that a conference should be held in connection with the British Industries Fair, 1931, and it was agreed to give the Society's support. Mr. Frank West, Mr. C. A. Goodall, and Dr. E. W. Smith were appointed the Society's representatives on the Committee for 1931.

It was reported that a conference, convened by the Board of Trade, had been held on April 3 at the Board of Trade, of representatives of the National Gas Council, the Institution of Gas Engineers, the Society of British Gas Industries, and the Gas Companies' Protection Association, to discuss the best means of carrying into effect the recommendations contained in the report of the Departmental Committee on Deaths from Gas Poisoning.

The arrangements for the Annual General Meeting and Dinner on May 16 at the Hotel Metropole, London, were reported.

The officers for 1930-31 were nominated, and the draft annual report of the Council was considered, amended, and approved.

**Cheaper Gas and Coke for Newburgh.**—At a special meeting of the Directors of the Newburgh Gas Light Company on April 14 it was decided to reduce the price of gas by 10d. per 1000 c.ft., making the price 5s. 5d. instead of 6s. 3d. per 1000 c.ft. It was also agreed to reduce the price of coke by 2s. per ton.

**North of England Gas Managers' Association.**—The Annual General Meeting of the Association will be held on Friday, May 2, at 2.15 p.m., at the County Hotel, Newcastle-on-Tyne. Mr. C. F. Blincoe, the President of the Association, will occupy the chair. Papers will be read by Mr. H. B. Kendrick, of Conway, on "Control of Vertical Retorts;" and by Mr. J. W. Pallister, of Middlesbrough, on "Extensions to Purifying Plant at Middlesbrough."

**Exhibition and Cookery Lectures at Hereford.**—The Hereford Corporation Gas Department, in conjunction with Messrs. Radiation Ltd., held a series of cookery lectures during the past 10 days which have been very popular and attracted a large attendance of people. In addition to these lectures, which were opened on the 7th inst. by the Mayor of Hereford, Mrs. Councillor Luard, M.B.E., the Gas Department have had a very attractive exhibition of gas apparatus which has been greatly admired by over 1000 people who have visited the hall.

**Gas Exhibition at Stranraer.**—The Stranraer Gas Company are holding an exhibition of gas heating and cooking appliances in Shepherds' Hall, Stranraer. The exhibition, which was opened on April 21, is to last five days, and the opening ceremony was performed by Mr. John Clement, Chairman of Stranraer Gas Company. Miss E. M. Dodds, M.C.A., is giving cookery demonstrations each afternoon and evening, and a baking competition for adults will be held. Essay competitions are being run in the local schools, the subject of the boys' essays being "Gas and Its Uses," and the girls' "Cooking by Gas."

**Attractive Offers at Halifax.**—The Halifax Corporation Gas Department (the Engineer and General Manager of which is, of course, Mr. W. B. McLusky, late President of the Manchester District Institution of Gas Engineers) have instituted a new offer to householders for the installation of water heaters on a flat rate charge of 4d. per day for a 20-gallon heater, the pipe being direct from the main to the heater without passing through the meter. Another innovation by the Halifax undertaking is the fixing and equipment of new positive distance gas switches at a rate of 2s. 6d. per point per quarter for three years, the switches then becoming the property of the householder.

**Primitiva Gas Company Report.**—The twenty-ninth annual report of the Primitiva Gas Company of Buenos Aires for the year ended Dec. 31 last shows that the balance of revenue account for the year 1929 amounts to £329,750, which, together with the addition of sundry other receipts, makes a total of £340,820. After deducting the usual outgoings and adding the profit of £56,605 brought in from the previous year, there is an available balance of £303,326, out of which the Directors allocate to depreciation and renewals account £75,000, and to contingencies reserve £25,000, and recommend that a dividend of 1s. 3d. per share, *less* income-tax, be paid, absorbing £145,286, leaving to be carried forward £58,040.

**The "Fairy Gas" Competition** organized by the British Commercial Gas Association offers the joys of creation to fill some of the leisure hours of school children, to their moral and material profit. The youngest entrants will have to work a simple picture (a gas fire and rug) in cross-stitch on a piece of canvas; older children will paint a picture of Sunshine City, where only smokeless fuels are used; the girls and boys over 12 have to write an essay. The Competition tasks should provide pleasurable hours in many homes, and there is the additional stimulus that the Association offers a number of money prizes and two £50 scholarships for the best entries. Full particulars of the Competition, which will open on April 25 and will close on June 16, can be obtained from the Secretary, the British Commercial Gas Association, 28, Grosvenor Gardens, S.W. 1.

**"Plumbing and Gasfitting."**—Vol. IV. of this useful work has been published by Sir Isaac Pitman & Sons, Ltd., at 6s. net. From the point of view of our readers, the immediately practical section of the book is on service laying, by T. V. Garrud and W. Dieterich, both of the Gas Light and Coke Company. Within its compass, this is an excellent essay on the subject, clarified by numerous illustrations; in fact, our readers would find a good six shillingsworth in this section alone. There are three further sections. In the first, the author, H. G. Adams, deals with drainage, drainage fittings, their ventilation and cleaning; the next section, by P. Mauser, consists of simple arithmetic and mensuration, with various methods of calculation: this is followed by a section on the methods of jointing and fixing the various pipes used in plumbers' and gasfitters' work, by S. P. Marks; "Service Laying," to which we have already referred, completes an admirable book.

## Who Visits the B.I.F.?

The Board of Trade published last week an interesting review of the results of the British Industries Fair, which includes a list of countries in order of the number of visitors each sent to the Fair. At the head of the list is Holland, followed by Canada, the United States, Australia, Germany, France, India, Belgium, South Africa, New Zealand, Switzerland, Argentine, Denmark, Sweden, Italy, Japan, Austria, Spain, Norway, Poland, China, Czechoslovakia, and Ceylon. This, of course, is not a complete list of all the countries whence visitors came to the Fair, the total being seventy, of which twenty-six were European and eighteen Dominions and Colonies.

**Electricity not to Supersede Gas Lighting at Tiverton.**—A resolution proposed at the April meeting of the Tiverton Town Council to substitute electric lighting for gas lighting in the three main streets of the town was defeated.

**British Compressed Air Society** have been formed to promote and develop the interests of British air compressor, pneumatic tool, and pneumatic appliance manufacturers, and to consider all questions connected therewith, except relationship between employers and employees. Most of the leading manufacturers in the industry are members of the Society, and have got together for the purpose of making a united effort to get this class of British machinery more extensively used. It is their aim to do a considerable amount of educational work for the industry, as the uses of compressed air are extending so greatly. There is hardly any industry in which compressed air cannot be advantageously used. The members are confident that there is great scope for their activities, and hope to assist other industries to realize the benefits arising from the use of compressed air, as well as to aid them in using it most economically. It is the intention of the Society to produce a regular bulletin, and eventually to become the recognized authority for all questions relating to the use of compressed air.

**George Wells and Company** have been registered, with a nominal capital of £500, as makers of engineers' plant and tools, accessories, gas, hot water, and steam pipes, and ironmongery. Offices: 12, Union Street, Southwark, S.E 1.

**Death from Walsall Explosion.**—As a result of the explosion which injured three workmen at Walsall during the laying of a gas main, referred to on p. 156 of last week's "Journal," one of the men, Philip Etheridge, has subsequently died.

**Gas Profits and Relief of Oswaldtwistle Rates.**—The Oswaldtwistle Finance Committee recommended that the contribution from the Gas Department to relief of rates for 1930-31 be £1000. This decision was questioned at the Council meeting on April 10 by Councillor Taylor, who said it was wrong in principle that profits from the use of gas should be utilized to relieve rates. Councillor Scholes, Chairman of the Gas Committee, said he had contended for years that the Gas Undertaking should not be called on for rate relief. So far he had succeeded only in getting the figure required kept down to £1000. The Chairman (Councillor Ward) said it was only a recommendation to the new Council.

**"Refractories and Their Uses."**—On Friday evening, April 11, Mr. Frank Russell, F.G.S., Chairman and Managing Director of Messrs. General Refractories, Ltd., of Sheffield, gave a lecture to the Sheffield Section of the Institute of Metals, in the Non-Ferrous Lecture Room at the Applied Science Department, St. George's Square, Sheffield, on "Refractories and Their Uses." The lecturer amplified his remarks with a very large number of most interesting specimens, and dealt with the growth and expansion of the refractories industry throughout the ages. Mr. Russell explained how, by research and experimental work, refractorers were in a position to supply industry with bricks which would last many times longer than materials previously used. He showed specimens of some of the very latest types of refractories, and the meeting closed with a very warm vote of thanks to Mr. Russell for his excellent talk. Mr. F. C. Robinson, A.I.M.M., presided, and there was a good attendance.

# Progress in Coke Research.

### Annual Report of the Northern Coke Research Committee.

A recent report* issued by the Northern Coke Research Committee outlines some of the more important results which have been obtained in the Coke Research Laboratory, at Armstrong College, Newcastle-upon-Tyne, and at various works during the year ended Dec. 31, 1929. The report states that cokes obtained from "box tests" agree well with those made in full-scale oven charges; but "bag tests," while giving good results on the whole, are less reliable. Coke from "box tests" tends to be larger than the corresponding full-scale oven cokes. Uncompressed cokes have been shown to be more porous, larger, and of higher shatter index than compressed cokes. Examination of gas cokes made from the same coal, in vertical and horizontal retorts, indicated that "horizontal" cokes were larger, denser, and of higher shatter index than "vertical" cokes. Examination of the influence of the size of coal on the resulting coke has shown that up to a certain degree of fineness, the shatter index of a coke increases, with decreasing size of coal particle, and it is concluded that to obtain a strong coke the proportion of coal above ¼ in. size should be a minimum, while the influence of the coal below ⅛ in. is to some extent adversely affected by its liability to oxidize. Cokes produced from the same good Durham coking coal in "patent" ovens, in compressed and uncompressed charges, and in beehive ovens were submitted to full-scale cupola tests, and it was shown that the uncompressed "patent" coke had the lowest melting efficiency, while the beehive coke was but slightly superior to the compressed "patent" coke.

A large number of cokes were examined by the special combustibility test developed in the Northern Committee's Laboratory. Cumberland cokes have been shown to give lower maximum temperatures and greater carbon consumptions than Durham cokes. An examination of the influence of catalysts on combustibility indicated that impregnation of a coke with ferric oxide caused a marked lowering of the maximum temperature and an increase in carbon consumption; conversely, with a coke containing a ferruginous ash, extraction of iron with hydrochloric acid diminished the carbon consumption. It was not possible, however, to correlate the behaviour of cokes on combustion with their ash analyses.

A number of cokes have been prepared in an experimental oven which takes a charge of 3 cwt. of coal. Except in porosity, cokes made in this way are closely similar to the corresponding full-scale cokes, and it is concluded that this method has substantial advantages over "box tests." Utilizing the experimental oven, blending experiments have been carried out with Northumberland high-volatile "non-coking" and typical Durham coking coals. Chemical examination showed that the Northumberland coals, compared with Durham coking coals, were characterized by high moisture and volatile contents, by low-caking indices, and by low carbon and high oxygen and sulphur figures; laboratory tests at 600° C. by the Gray-King assay, indicated that Northumberland coals produced smaller quantities of coke and gas, but greater quantities of tar and liquor than Durham coals. It was found that, on carbonization, Northumberland coals gave cokes of lower shatter index than Durham coals; blending experiments showed that the mechanical strength of Durham cokes was considerably diminished by additions of 10 to 20 p.ct. of Northumberland coals, but that greater proportions of the latter did not give a proportionate lowering of the mechanical strength. Caking indices determined by the Gray-Campredon method are found to give but little indication of the shatter index to be anticipated in a coke.

The Northern Coke Research Committee have collaborated with the Midland and Scottish Committees in preparing a standard specification for the shatter test, and valuable results will undoubtedly be obtained as a result. The Committee is also represented on the British Engineering Standards Association Panel for the standardization of an agglutinating test for coal, and, at the request of this Panel, is carrying out a certain amount of work on this test.

The report concludes by stating that although since its formation the Committee have given much information as to variations in the quality of coke which may result from variations in carbonizing conditions, the general trend of the research is to show that a knowledge of the intrinsic carbonizing properties of the coal is of primary importance. The blending experiments have shown that the addition of quite small quantities of inferior coking coal produce a more than proportionate lowering in the quality of the coke, and, as the majority of coke ovens and gas-works are carbonizing coals which are in themselves almost invariably blends, and as coals are blended for export purposes, a knowledge of the fundamental principles involved in the practice of blending is of the utmost importance to the whole industry. For these reasons the blending programme is being actively pursued.

* Annual Report No. 1. Summary of the work carried out in the Northern Coke Research Laboratories during the year ended Dec. 31, 1929. Published by the Northern Coke Research Committee, Armstrong College, Newcastle-upon-Tyne.

# Gas in Japan and the Far East.

By Walter T. Dunn, M.I.Mech.E.

**[Abstract of a Paper before the Junior Institution of Engineers, April 11.]**

In effect the paper described the author's experiences during a series of visits which he made to various gas-works during the course of a tour taken in the latter part of last year, when he was present in Japan and the eastern ports of the world in connection with the World Engineering Congress and the Tokio Sectional Meeting of the World Power Conference. He embraced the opportunity of examining fully the position of the gas industry in the island empire especially, with, later, visits to the gas-works at Shanghai, Hong Kong, Singapore, and Colombo, on his voyage home.

Through friends among the gas engineers of Japan, particularly Mr. Sakura Okamoto, he had facilities granted which enabled him to obtain the information he had embodied in his communication to the Institution. It was fully illustrated by means of lantern slides, many of them giving an excellent idea of the impressive natural beauty of the towns included in his itinerary. There were also a number of views of a technical character, the slides of which had been lent by the Woodall-Duckham Companies, and by West's Gas Improvement Company. In a brief historic survey contained in the paper it was pointed out that Japan owed its first gas supply to the action of the German Consul von Adolph Reis, who attempted to obtain a franchise from the City Authorities of Yokohama in the year 1870. His original plan, which was endorsed and supported by the Belgian Minister, was to erect lamp-posts along the streets, which were to be illuminated by coal gas provided by a private concern. The Corporation, however, ultimately decided to grant a franchise to native business men rather than to foreign residents, but when the interested persons became incorporated the concession was eventually handed to them.

The work of construction was begun under the supervision of a French Engineer, M. Pellegrin, and was completed in the year 1872. The public thoroughfares of Japan were then lit by gas lamps for the first time. Previously to this it was proposed to establish a similar undertaking in the city of Tokio, but the project was not realized until the following year. That work was also carried out by M. Pellegrin, and in 1874 the streets of the Japanese metropolis were illuminated by gas for the first time. About that period the dawn of the new era of the beneficent reign of the Emperor Meiji was breaking. Anything which western civilization could bring into use in such a transitory epoch naturally created a deep impression upon the people. In gas a keen interest was taken from the beginning. Its brightness contrasted strongly with the petroleum oil lights which, up to that time, had been used in the public roads. Financially, however, the living conditions of the people would not permit of their utilizing the new form of illuminant for domestic application. At the end of the year 1877 the number of gas consumers in the city of Tokio was only nineteen.

In the year 1892 a gas business started by the citizens of Yokohama was afterwards placed under the direction of the municipal authorities; while in Tokio the gas undertaking was originally maintained by a public fund set aside as the result of emergency economies of the feudal Shogunate Government. In the year 1885 it was transferred to private ownership, with the object of encouraging the further development of the gas industry. During the following twenty-seven years no very noticeable progress was made, but about the beginning of the twentieth century a fresh impulse was given to it. In the year 1903 there were five gas companies; in 1908, eight had been established; and in 1911 there were thirty-three, their total capital being 37,940,000 yen, the value of the yen being approximately two shillings. At the close of the Russo-Japanese war in 1904-5, at the moment that a sudden and intense activity occurred throughout all business and industrial circles, the practical utility of gas for heating and lighting was fully recognized. With the remarkable development of other industries of Japan the gas industry also began to forge ahead. It is recorded that in the year 1912 there were 494,391 consumers, and that the volume of gas made was 4,359,643,893 c.ft. The number of gas engines in operation was 2347; the number of heating installations 591,240. The figures for the year 1915 became 611,007 consumers and 6,224,383,966 c.ft. of gas made, but the number of gas engines in use had declined to 1970. In 1912 the number of street lamps in use was 6599; and in 1915 it had advanced to 9283.

With the development of gas there came also a phenomenal development of electrical service. From the year 1907 to 1914 the number of electricity consumers had increased fifteen times, and reached no less than 3,270,000 by the year 1914. The number of lights which had been installed was 8,420,000, equivalent to a ninefold increase approximately. Of electric motors there were over 42,000 in use. It was of course natural that the newer electric lighting and power should influence the progress of the sister gas industry, and it became more and more evident from the year 1914. In the year following, records show that there were 9283 street lamps lit by gas, and that by 1925 the number had been reduced to 1091. Of gas engines in 1915 there were 1970 at work, and in 1925 only 497.

Gas for lighting showed a tendency to diminish after 1915 until 1923, when the great earthquake destroyed a large part of the gas fixtures of Tokio and the surrounding neighbourhood. Greatly to the credit of the gas undertaking officials there, however, within the space of only three weeks the supply had been restored—a feat necessitating the exhibition of indefatigable labour on the part of all concerned. It may at once be said that gas for lighting purposes in Japan has now become secondary to its employment for heating. Gas for lighting is at the present time used only to provide for the possibility of a breakdown of electrical installations. The great war also affected the continuance of the progress of the gas industry of Japan. In the year 1915 the number of consumers was 611,007. which diminished to 488,422 in the year 1919.

An idea of the dimensions and growth of the Japanese gas industry could be gathered from the statement of the length of the mains. In the year 1922 the total length of mains laid throughout the empire was 3633 miles. At that time gas was used in 552,367 homes, and the annual consumption was 12,206,342,642 c.ft. Five years later, in 1927, the length of mains had become 5228 miles, an increase of about 44 p.ct., while the consumption of gas had risen to 17,284,500,000, an increase of 42 p.ct., the number of homes supplied being 853,688, an increase of 73 p.ct. For the year 1926 the average consumption of gas in each home, and per head of consumer in each of the six principal cities of Japan, was as follows:

| — | Per Head. | Per House. |
|---|---|---|
| | C.Ft. | C.Ft. |
| Tokio | 2754 | 25,462 |
| Asaka | 821 | 15,041 |
| Nagoya | 1258 | 16,664 |
| Kyoto | 1350 | 18,647 |
| Kobe | 1726 | 16,421 |
| Yokohama | 490 | 11,988 |

Compared with the year 1912, when the average consumption was 9778 c.ft., the figure of 17,370 c.ft. for 1926 shows that the consumption of gas per house had almost doubled in the course of a period of fourteen years.

The author showed that the total capital invested in the gas industry of Japan in the form of paid-up capital, loans, &c., amounted in 1926 to 178,000,000 yen. If the amount for collateral expenses be taken into account, the total reaches more than 700 million yen (£70,000,000). Spinning mills, paper mills, and sugar refineries constitute the principal commercial enterprises of Japan. The gas industry has achieved the position of third on the list, having attained it in the year 1926. In addition to the gas-works in Japan itself, there are others in the colonies of Korea, Formosa, &c.

In regard to the prices charged for gas, Mr. Dunn found that they vary widely in the various cities. There is no universal standard price. The average charge is about 3 yen (say, 6s.) per 1000 c.ft. Although the system of payment is not by the therm as in Great Britain, steps are now being taken to introduce that system of charge, and an English gas engineer has been engaged to furnish the data required, and to prepare a report.

If the total consumption of gas in Japan be taken as 17,284,500,000 c.ft., selling at 51,550,000 yen, and the total capital be taken at 186,000,000 yen, the result is a gross income of about 30 p.ct. There can, therefore, be no question that the Japanese gas industry is in a flourishing and stable condition. In 1928 the effect of the success of the electrical industry was so marked that the gas industry determined upon an extensive propaganda programme. By that means the declining tendency of gas statistics has been distinctly arrested, and the popularization of the advantages of gas as a clean, hygienic, inexpensive, and reliable commodity has been brought about.

In common with his fellow members of the Congress and Conference, Mr. Dunn was immensely impressed by the splendid spirit displayed by the people of Japan after the overwhelming catastrophe which overtook the city of Tokio in 1923.

The writer in his peroration about Japan said: "One departed from the land of the Rising Sun with feelings of admiration and respect for a nation that has shown such untiring

industry in all phases of scientific endeavour. In the comparatively brief period of about fifty years, during the beneficent reign of the venerated Emperor Meiji, Japan has gained such a position in the affairs of the world as to be accepted as one of the five Great Powers."

The other portion of the paper dealt with the gas-works at Shanghai, at Hong Kong, at Singapore, and at Colombo. At each of these ports at which the P. & O. steamer "Kashgar" called the author took advantage of the opportunity of visiting the respective gas undertakings. He was welcomed by the officers and shown everything in every-day operation. His cordial acknowledgments of the courtesy extended to him were expressed.

An interesting discussion followed, in which Mr. A. C. Hovey (who has visited Japan), Mr. W. H. Bennett, Mr. Henry King Hiller (who for seventeen years was Chief Engineer at the Shanghai Gas-Works), Mr. Allen, Mr. A. W. Marshall, and others took part. A vote of thanks was accorded the author.

# Inauguration of Woodall-Duckham Continuous Verticals at Tredegar.

A note of optimism as to the future of the gas industry in this country was sounded at the formal opening of the Woodall-Duckham vertical retort installation at the Gas-Works of the Tredegar Urban District Council, Monmouthshire, on Wednesday afternoon, April 16.

### DESCRIPTION OF NEW WORKS.

The Woodall-Duckham installation consists of one bench containing six retorts set in single units, heated by means of two producers placed at retort house floor level on one side of the bench.

Coal is discharged by hand from railway wagons into a small receiving hopper at rail level. The large coal is fed from this hopper into an 8-10 ton per hour coal breaker by means of a jigging feeder fitted with a screen. The small coal passes through a by-pass and joins the crushed coal in the breaker chute.

The coal is then fed into a 10-ton per hour elevator which delivers it into the overhead storage hoppers. From here it passes through special valves into the auxiliary supply hoppers fixed to the top mouthpieces of the retorts. Each retort is about 25 ft. high.

The design of the setting is in accordance with the latest practice of the Woodall-Duckham system, incorporating the following special features.

Each retort is absolutely separate from the next, straight joints being built between retorts so that any individual retort may be heated up, cooled down, or scurfed without affecting the others. Each retort is provided with its own producer gas, secondary air, and waste gas dampers, and thus forms a separate heating unit. Maximum flexibility of output is thereby ensured.

The retort faces and combustion chambers are constructed of best-quality silica material for the major portion of the depth of the combustion chambers. This ensures low maintenance costs, coupled with high output per retort.

In order to provide means of varying the relation between the temperatures at the top and the bottom of the combustion chambers, additional secondary air inlets are provided at some distance above the main nostrils. It is then possible to vary the zoning of the heats according to the type of coal carbonized and the calorific value of the gas to be made.

Both the side walls and the top of the bench are heavily insulated, with the double object of improving the working conditions and of saving fuel.

Two step-grate producers are supplied, each large enough to supply the gas requirements of four retorts. They are so arranged that either producer may be shut down independently, and so that the gas from either producer may be supplied to the heating flues of any of the retorts.

### COKE HANDLING PLANT.

The coke is discharged from the retort hoppers into a side-discharging skip running on steel rails laid on the floor of the retort house. When the coke is required for firing the producers, this skip is run into a steam lift and elevated to the producer charging platform level. It is run out of the lift on to cast-iron plates laid on the top of the producer brickwork, and the coke is discharged from the skip into the producer charging holes. Surplus coke is elevated in the lift to the level of an outside gantry. The skip is run along the gantry and discharged either direct into railway wagons or into open storage in the yard.

There is a waste-heat boiler of the vertical firetube type, by Messrs. Cochran, which raises steam at 100 lbs. per sq. in. pressure.

The weighbridge, by Messrs. Denison & Son, has a platform 20 ft. long, and is capable of weighing 20 tons.

The messroom, which will meet a long-felt want, is heated by gas, and is provided with a gas cooker. A "Sunhot" boiler, fixed in a corner of this room, provides all the hot water for the building.

The whole of the work was supervised on behalf of the Council by the Council's Gas and Water Engineer, Mr. D. Walter Davies.

### THE OPENING CEREMONY.

Councillor TOM MORGAN, Chairman of the Council, emptied a load of coke for a retort into a skip, and formally declared the works open.

After this the company, which included a number of gas engineers from the South Wales area, together with other prominent visitors, inspected the plant.

At a later stage Mr. George Harries, Chairman of the Gas Committee, presented Mr. T. Morgan with a silver key with which formally to open the splendidly equipped rest room, bath room, &c., for the use of the employees. This has been erected at a cost of £1400.

Declaring the building open, Mr. MORGAN said that those resident in the urban area knew full well the difficulty there had been, especially in winter time, in supplying the needs of their gas consumers. By means of this installation the difficulty was solved, and he wanted to express his appreciation of the work of the Woodall-Duckham Companies, the Contractors.

At a repast at which those present were subsequently entertained, Mr. MORGAN, who presided, proposed the toast of "The Visitors."

Mr. JAMES E. KENSHOLE (Mountain Ash) responded, and congratulated the Contractors, the Council, and the Council's Gas Engineer. He had no doubt the new plant would be a paying proposition.

Proposing "The Gas Industry," Councillor JOHN STOCKTON said that the gas industry was the industry of sunshine so far as the working class of the community was concerned; it had brought sunshine into countless thousands of homes by easing domestic burdens.

Responding, Mr. J. HERBERT CANNING, O.B.E. (Newport), expressed pleasure that the densest of the clouds which overhung the coal industry in Tredegar in 1928 were passing away. They had installed at Tredegar an up-to-date plant which reflected the highest credit on all concerned. He suggested to the Council and the Gas Committee that, before giving electricity a trial, they should very carefully consider whether it was suitable for a district such as this. There were 5000 houses in Tredegar, and he understood there were only 200 cookers in use. He suggested it might be possible to increase that number and get a load for the new plant which would reduce the overhead expense and enable the price of gas to be reduced. Not only had they installed a modern plant, but they had also made provision for the comfort of the men. Tredegar had an excellent Gas Committee, and in Mr. D. Walter Davies an excellent servant, who was respected not only in Tredegar but throughout South Wales.

Mr. FRANK QUICK, J.P. (Newport), and Mr. BARTON GRAINGER (Caerphilly) responded.

Mr. GEORGE HARRIES proposed the toast of "The Contractors." It was a Company, he said, which from small beginnings had grown until it had its plants installed in all the corners of the earth. The firm had met the Committee with every courtesy.

Mr. D. WALTER DAVIES supported.

Mr. F. B. RICHARDS, a Director of the Woodall-Duckham Companies, responding, said he much appreciated the tributes which had been paid. He believed the plant was a good one, and the Council would have no cause for complaint. He thanked the Council, the Gas Committee, and the Gas Engineer for their help and courtesy at all times. It was very gratifying to hear what had been said of the future of the gas industry.

Mr. ANEURIN BEVAN, M.P. for the Division, proposed "The Town and Trade of Tredegar." He said he hoped the success of the plant in Tredegar would encourage other authorities in South Wales to do likewise, with advantage to the Woodall-Duckham Companies. He was glad to know that it would not be necessary to go outside the town for the bulk of the coal necessary for running the plant.

Mr. W. D. WOOLLEY, M.E., J.P., Managing Director of the Tredegar Iron and Coal Company, who responded, referred to the fact that the plant was using coal from the district which had a low volatile content, while practically all other gas-works in the country were using only high volatile coal. The Tredegar Company in the past had been unable to sell steam coal for gas making, but here was a plant which could, and did, use it. The coal his Company were supplying to the Council was essentially a steam coal, and was largely of the kind which was used in the London power stations for making electricity.

The proceedings concluded by Mr. RICHARDS, on behalf of the Contractors, presenting Mr. George Harries with a massive piece of inscribed silver plate, to mark the event.

Mr. HARRIES, replying, said how highly he appreciated the gift.

# The Economics of Load Building.*

By Oscar H. Fogg, Vice-President, Consolidated Gas Company of New York.

My interpretation of the "Economics of Load Building" is simply the profitable expansion of our business along sound economic lines, and I think it is obvious that anything even remotely approaching a comprehensive treatment of so broad a subject is beyond the scope of any one man, any one meeting, or any one convention. The developments of the last several years indicate that the gas industry, if not entirely, is very generally alert to the importance of the selling effort, and the need for trained and efficient salesmanship and sales leadership of the highest order. Similarly the industry now seems to be cognizant of the competitive conditions that confront us in practically every one of the avenues open to the extension of gas service.

The American Gas Association has done a great service in emphasizing the importance of these essentials, and promoting their acceptance by the industry through the presentation of facts derived from nation-wide surveys of our sales methods and market conditions. Your own New England Gas Association has also been of substantial aid in crystallizing thought and stimulating action along similar lines. But there are some other phases of the question which appear to have been less thoroughly considered, and which, because they are somewhat fundamental in character, invite analysis and discussion.

Although we agree upon the vital importance of the selling effort, the feeling persists that salesmanship in the gas industry is still under-developed. Those who feel called upon to explain, and perhaps to justify, this feeling do so on the ground of the apparent lack of executive interest in our promotional work. Certainly there was a time when that interest was conspicuous by its absence, and there are many who feel that it has not even yet been adequately demonstrated. But I think that, in the main, there is evidence of a significant change in this respect, one indication of which was the alacrity with which a large and representative group of gas company executives accepted service on one of the important committees of the Commercial Section of the American Gas Association, when an invitation was extended to them a month or so ago to serve in an advisory capacity in the preparation of a study course on sales managerial practices. Twenty executives were invited. Not one declined!

But we need more than executive interest; it must be coupled with the most practical kind of executive leadership and support. In this age, no business can endure if its commercial development and growth are not made a major executive function. That should not be interpreted as a demand that the sales executive shall be the boss. It is rather the expression of a conviction that the boss to-day who does not appreciate the importance of the modern promotional activity, and provide brains, ability and dollars to conduct that work intelligently and aggressively, would do well to step aside and let someone take his place who has a proper appreciation of our industry's vital needs.

Among other criticisms is that our promotional work is sometimes of a rather haphazard nature, and that a closer observance of underlying economic principles is necessary. There is certainly some justification for that view, and, to me at least, it suggests the importance of focussing attention on several elements which will undoubtedly exert a great influence on our future growth.

## The Trend of the Load Curve.

If we needed any reminder of the present-day trends of our load curve, we find it in the relation of investment to gross revenue. That in itself emphasizes the importance of greater selectivity in our load building, and of giving proper weight to the economic value of potential business.

It seems reasonably certain that in the highly competitive fuel market of to-day, there will have to be not only revision of some of our rate forms, to enable us to extend our service in competition with other fuels, but more liberal expenditures for promotional work. The allocation of such expenditures, however, should be determined by sound business judgment in the light of the facts derived from a detailed study of the potential fuel market.

By surveying, analyzing, and classifying this market, we can determine with reasonable accuracy the relative value of each of the various groups of uses which, taken together, represent the field of our possible growth. The factors that must be studied are: The condition of fuel usage; the burden imposed upon our manufacturing and distribution facilities; the extent to which each separate class of business can be taken on without adding to the existing investment, or the amount of added investment necessary to care properly for such business; the characteristics of the fuel demand and its influence upon the economy of manufacturing and distribution operations.

With such factors understood, the relative value of each class of business will be fairly definite. My use of the term "value" in this connection is intended to mean true economic value as ultimate translated into terms of net revenue. A study of this kind will show that the various classes of potential business have different values when viewed from this practical light, or, as we might say, they will take rank in attractiveness or desirability in the order in which they contribute to the net earnings. This, in the end, is the objective of business operations generally. Why not allocate expenditures for promotional work on the basis of relative value to the company of each class of prospective business? This does not mean promoting the use of gas service to a few particular groups of business to the practical exclusion of all others. Neither does it mean resting on our oars when a considerable portion of any particular class of the potential market has been adequately covered by gas service.

## Progress in Scientific Rate Structures.

In our attempt to attract more desirable business, we have, I believe, made much greater progress in the development of scientific rate structures than in scientific sales promotion. In the development of promotional rate forms, we extend to the purchaser certain price advantages, because our study of his fuel requirements and character of use indicate that we are able to supply his needs under conditions which are advantageous to us—conditions which make for the more balanced and efficient operation of our plant and service facilities.

The gas industry generally agrees that this is a sound position; therefore the same considerations should determine to a much greater extent than they do the direction and intensity of our promotional efforts; in short, the division and allocation of promotional expenditures should be governed by the same economic principles that underlie modern and scientific forms of rate structure. I am not alone in the opinion that, if the same amount of time and attention had been given to this question as has been given to the subject of rate structures, not only would some of the problems of the latter have been greatly simplified, but our general economic position would be much stronger than it is.

Let us carry that same line of reasoning a step further and apply it to the question of salesmen's compensation. As I have said on other occasions, the whole purpose underlying our sales activity is to expand the use of gas service. But mere growth in volume sold is not enough. The growth must be orderly, logical, and in accord with the most efficient production and distribution operation. The sales value of load building should also be regarded in the light of its economic value. The effect of the sales representative's work on the company's earnings should be directly reflected in their compensation.

Under given conditions of rate structure, population, and nature of territory served, some classes of utilization will yield better earnings than others. Often that class which we used to speak of as the backbone of our business—the domestic or household use—produces unsatisfactory returns, and the reason for this has been extensively discussed and is well known to us all. These non-compensatory customers, depending to an increasing degree upon the service stations of life—the bakeries, laundries, delicatessens, and the restaurants—and finding relaxation and entertainment more and more away from home, present an interesting and a serious problem. A large number of these casual and convenience customers are served at actual loss. We cannot simply mark them off the books and limit our service to those whom it is profitable to serve. Unless we are fortunate enough to be able to establish a rate form that compensates us for these limited conditions of use, we have but one logical alternative—and that is to make these non-compensatory customers profitable by stimulating their demand for our service through the use of modern and properly balanced load building appliances. As many of the customers are the modern "cliff dwellers" the sale of appliances for furthering their use of gas service is very limited. Several companies have made remarkable strides with the refrigerator. This added load requiring practically no increase in production or distribution facilities, is of the most desirable character, often entirely reversing the status of what had been an unprofitable customer, and in the aggregate, producing added revenue with little or no addition to the investment.

I have taken this simply as a concrete illustration of load building in its economic relation to the company's earnings. Certainly the sales representative who is successful in building up the load of non-compensatory customers and carrying

* Presented at the annual convention of the New England Gas Association, Boston, Mass., Feb. 19-20.

them over the line into the class of those who contribute their reasonable share of the net earnings is entitled to compensation that recognizes the economics of the case.

Similarly, added industrial business of relatively uniform volume throughout the year is far more valuable than the same volume consumed in a more limited period, because it contributes in greater degree to the company's earnings. Should not the compensation system give due consideration to these economic facts? In my opinion, unless it does so, it cannot be considered as sound, from the standpoint either of the company's interest or that of the employee.

### SALES EFFORT MUST BE ENDURING.

Another value to be placed upon sales effort is the enduring character of the sale made. By more detailed study and intelligent effort the sales representative can frequently suggest ways in which the operation will be more economical to the user even though the load to the company is reduced. This fortifies the position of gas service against competitive fuels and will build a lasting load secure against the efforts of competitors to dislodge it. Should the compensation of our sales force be penalized for building such a permanent load instead of a meteoric flash of high intensity which may soon pass?

The increase in gas service on an economic basis can result only through salesmanship. The ability and energy of the sales representatives are to be recognized to the utmost. Outstanding accomplishments should be rewarded, and no limit placed on earning capacity of the sales representatives. If our compensation system is sound, the higher their earnings the happier everyone will be—including the stockholders.

Here, in at least three of the essentials of building the load on an economic basis—that is, (*a*) in the expenditure of money to secure business; (*b*) in the development of rate forms designed to secure business under the competitive conditions that now prevail; and (*c*) in the development of sounder systems of salesmen's compensation—it would appear that readjustment could be made in each to approach more closely the requirement that is of the greatest practical importance, and that is, "what is it worth to us?" In a few words, spend most to get the most valuable business; give to each class of business (or use) the best rate its value can earn; and pay sales representatives according to the value of the business they secure.

In those companies supplying utility services other than gas service, such as electricity, water, or transportation, the gas department should stand on its own feet and supply its own funds to increase or better its load conditions. To be the poor relation is not only uneconomic but unsatisfactory, even though through the help of our richer relatives we are enabled to bring about the increases which are so eagerly sought.

We will be aided in this respect by the formulation and general adoption of sound accounting methods and policies as they relate to our entire merchandizing and promotional activities. Just how clearly the line can be drawn between the two is difficult to say, but the Joint Committee on Merchandise Accounting of the American Gas Association has recognized the need of adequate accounting records of merchandizing operations, as apart from other new business activities, and is actively engaged upon the preparation of a classification of accounts and of standard forms of report, which will make available the correct measurement of the results of these operations. At the same time, the Committee realizes the close relationship—as inseparable in fact as the two blades of the shears—of merchandizing operations with other promotional activities which may not directly involve the sale of appliances; and I am told that it hopes to submit these report forms of appliance sales in such manner that the merchandizing results can be combined with other new business expenses to show the net result of the entire promotional activities.

Two years ago I had the honour of presenting to this gathering some observations on the subject of merchandizing and trade co-operation under the title "Sales Allies." I refer to it now only because it may be of interest to you to learn something of the progress that has been made in a situation where some of the principles referred to at that time have been put into operation.

Not quite two years ago we undertook in New York to develop co-operative merchandizing, proceeding in a modest way—not at all sure of our ground—but convinced that the best initial course was one of moderation and careful development.

At Dec. 31, 1929, we had gas appliances on display in the windows and shops of 105 plumbers, steamfitters, heating and piping contractors and dealers in the territory served by our group of companies. Only outstanding representatives of these businesses were selected, but practically all of our better plumbers, steamfitters, &c., are co-operating in the merchandizing of gas appliances.

The contacts formed by reason of the many transactions involved during the year enabled us to get better acquainted and better to understand and appreciate one another's problems. Let me repeat that no effort has been made to develop rapidly or fully this situation; it represents only a very small part of what may ultimately be done. It is not all that could be desired. It has its problems and its difficulties, but none, I feel sure, that cannot be overcome by fair dealing and patience. Our experience has strengthened the belief that we have much to gain by developing trade co-operation along sound and broad lines.

It is necessary that those charged with the direction of our promotional activities be brought into closer touch with, and kept constantly and accurately informed of, the ultimate financial results of their work. The application of fundamental business law points to the more rational alignment of the various components of our sales activities in accord with sound economic principles, is one of the gas industry's pressing needs. It calls for the collective judgment of sales and operating men.

No one person can hope to accomplish all this unaided and alone, but it can be accomplished definitely, and without too much delay, if we undertake it as an industry, working together.

# Automatic Exhauster Valve Control.

By F. R. THOMPSON, of Cutler-Hammer, Inc., Milwaukee, Wisconsin.

**[From the "Gas Age-Record."]**

A recent development of Cutler-Hammer, Inc., of an equipment for automatic control of discharge or inlet valves on exhausters is of interest. Serious results of an exhauster running in a reverse direction due to failure of coupling between the exhauster and engine or stalling of the engine where internal combustion is used is well recognized.

In emergencies of this kind either the discharge or inlet valve on the exhauster must be closed before the back pressure of the gas causes the reverse rotation of the exhauster beyond the safe operating speed for which it was designed.

The purpose of this equipment is to eliminate the loss of time required for an operator to get to the valve and close it by hand.

The equipment consists of only two pieces of apparatus—a special ratchet-driven switch and the standard valve control unit.

The special ratchet-driven switch is designed for convenient mounting at some point adjacent to one of the main bearings on the exhauster. To permit installing a chain drive from the exhauster shaft a hole is drilled in the exhauster bearing casing, and a small stud shaft is extended from the end of the main shaft through the casing. A sprocket is provided for the exhauster shaft to match the sprocket on the switch, together with a suitable length of roller chain.

The ratchet-driven switch is provided with a shaft which passes through the case. On the front end a lever is provided for normal manual operation, while on the rear end a ratchet and friction clutch are provided. The contact drum is mounted below the main shaft and driven from same by gearing. The lower part of the switch is an oil tank in which the contacts break in oil, making the switch explosion-proof.

When the exhauster is operating in the right direction, the ratchet on the switch is over running, but the instant the direction of rotation reverses on the exhauster the ratchet takes hold and throws the switch to the closed position. The friction clutch slips until the exhauster comes to rest.

The inlet or outlet valve is equipped with the standard valve control unit which incorporates the exclusive feature of a foolproof automatic clutch that magnetically clutches the control unit to the valve, only when operating the valve electrically. This feature permits hand operation of the valve upon failure of the electrical supply without the necessity of manually declutching and the possibility of an operator leaving the equipment inoperative electrically.

Several installations of this equipment have been made where reversal of the exhauster causes the equipment to function and closes the valve at the rate of approximately 2 in. travel of the gate per second.

While this equipment is applied as a safety device, it also provides quick operating electric control for the normal opening and closing of the valve, thereby reducing unnecessary labour and speeding up operation.

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# Presidential Address of Mr. David Fulton, Helensburgh.

## North British Association of Gas Managers, April 11.

## Part II.—The Helensburgh Gas Undertaking.

(*Concluded from p* 150.)

Gas was introduced into Helensburgh in 1844. Operations were carried on by the Helensburgh Gas Company until the year 1899, when the Gas Undertaking was acquired by the Town Council, the purchase price being £31,115, and the quantity of gas then manufactured 44 million c.ft.

The works were then in very poor order, the Directors of the Company having neglected renewals and repairs in view of the threatened transfer. The Council had therefore to proceed immediately with a large scheme of reconstruction. Within the first three years there were erected a new gasholder, purifiers, purifier house, station meter and house, exhausters and exhauster house, steam boiler, and horizontal retort benches.

At first it was proposed to erect the new gasholder on a site in the east-end of the Burgh, and later to erect an entirely new works alongside, but strong objection on the score of destroying amenity was offered by various residents in the district, and the matter had to be submitted to the Sheriff of the County of Dumbarton, who decided in favour of the objectors, upholding their contention that a gasholder could be built on a piece of ground on the other side of a street opening the east side of the existing works. The holder was accordingly erected there, and the works reconstructed on the old site situated in the heart of the Burgh and surrounded by dwelling-houses on every side. The inhabitants of these houses seem to suffer no serious ill-effects from their proximity to the works. Perhaps they have become used to it, or, like Macduff, bear a charmed life. The original site was in the shape of an inverted "L," but later the ground on which stood a small elementary school was acquired, so completing the present rectangular site.

The reconstruction and extensions have been attended all along with difficulty owing to the restricted nature of the site, and the layout of the works plant has unavoidable defects.

Between 1899 and 1919 the output of gas increased steadily from 44 to 80 million c.ft. per annum. Since then the increase has been very rapid, as shown on the graph, which also gives the consumption per consumer for each year. Between 1919-29, the number of consumers increased from 2863 to 3200, and it may be noted that in 1905 the number of consumers was 2456.

Increases in the sales of gas in any form are a source of satisfaction, but the increase which comes from increased consumption per consumer is, without question, the most satisfactory form possible. This point is not always taken into account when comparisons are being made with the previous results. The rapid growth has been due in major degree to the large extension in the use of gas fires, although the use of gas for cooking has also made very considerable strides. The only unsatisfactory feature of a large gas fire load is that it causes violent fluctuations in the daily outputs, demands varying with the weather conditions.

In connection with a report made recently to the Gas Committee regarding graduation of price rates, a group analysis was made of the consumers' ledger. The figures are made up on the same lines as those given by Mr. Campbell, of Dunfermline, in a paper read at Dumfries in September, 1927, and are given herewith, as comparison of statistics is always a very interesting study.

An analysis of our consumers' accounts for the year ended May 15, 1929, gives the following details:

| Scale of Consumption. C.Ft. per Annum. | Number of Consumers. | Total Consumption. | Average per Consumer. |
|---|---|---|---|
| | | C.Ft. | C.Ft. |
| Under 5,000 | 127 | 335,000 | 2,638 |
| Over 5,000 and under 10,000 | 171 | 1,294,500 | 7,570 |
| ,, 10,000 ,, ,, 20,000 | 429 | 6,595,800 | 15,375 |
| ,, 20,000 ,, ,, 30,000 | 475 | 11,947,700 | 25,153 |
| ,, 30,000 ,, ,, 50,000 | 762 | 29,621,300 | 38,873 |
| ,, 50,000 ,, ,, 75,000 | 361 | 21,929,900 | 60,747 |
| ,, 75,000 ,, ,, 100,000 | 170 | 14,725,500 | 86,621 |
| ,, 100,000 ,, ,, 150,000 | 152 | 18,283,400 | 120,285 |
| ,, 150,000 ,, ,, 200,000 | 52 | 15,746,200 | 171,154 |
| ,, 200,000 ,, ,, 250,000 | 32 | 7,073,000 | 221,031 |
| ,, 250,000 ,, ,, 300,000 | 27 | 7,237,000 | 268,063 |
| ,, 300,000 ,, ,, 400,000 | 26 | 8,942,800 | 343,954 |
| ,, 400,000 ,, ,, 500,000 | 10 | 4,497,200 | 449,720 |
| ,, 500,000 ,, ,, 600,000 | 5 | 2,643,100 | 528,620 |
| ,, 600,000 ,, ,, 700,000 | 3 | 1,936,700 | 645,567 |
| ,, 700,000 ,, ,, 800,000 | 1 | 723,400 | 723,400 |
| ,, 800,000 ,, ,, 900,000 | 2 | 1,989,300 | 994,650 |
| ,, 900,000 ,, ,, 1,000,000 | 1 | 987,900 | 987,900 |
| ,, 1,000,000 | 3 | 3,879,700 | 1,293,233 |

A conservative policy in capital expenditure has always been a central feature of the financial policy. The debt has been reduced to £38,060, and this includes about £11,500 for a new gasholder of half-million c.ft. capacity erected last year. In those days of rapid changes in forms of plant, the wisdom of writing off capital costs as quickly as possible cannot be too strongly emphasized.

It is with a sense of almost surprise one realizes that the Glover-West vertical retort plant has been at work since the middle of 1911, and that it will be 20 years' old next year. The courage and enterprise of my predecessor, the late Mr. William Blair, and his Gas Committee, cannot be too strongly commended. In those days it was considered almost foolhardy for anyone to adopt vertical retorts as the sole means of producing gas. Until 1927 six only of the sixteen retorts had been rebuilt throughout their full length; the remaining ten had received only patching and small repairs. Throughout the winter session, 1925-26, the plant was taxed to its utmost, all the retorts having to be put to work, leaving us without reserve plant. The plant was orginally designed for a maximum output of 500,000 c.ft. per day, but with steaming the output had been raised to 750,000 c.ft. per day. It was therefore agreed that increased production capacity must be obtained, and after considering various proposals to add to the number of retorts, decision was reached in favour of reconstructing one setting of eight retorts on the most up-to-date lines. The advantages of this were that the section actually required rebuilding, having been at work for 15 years, and that new capital expenditure was reduced to smaller proportions. The coal strike of 1926 prevented delivery of the refractory materials, so that the work had to be delayed until the summer of 1927.

In the reconstruction, all brickwork back and front was entirely removed, leaving only the end walls and ironwork standing. The old retorts had been of fireclay, top section 27 in. by 12 in., bottom 36 in. by 18 in., while the new retorts are 33 in. by 10 in. at top, and 39 in. by 22 in. at bottom, and 23 ft. long; built of silica sections and having a capacity of 3 tons per diem.

The original retorts were also 23 ft. long, but two sections at the bottom were not gas-fired, these being used for preheating the secondary air. In the new setting, one of these sections has been converted into a combustion chamber, thus increasing the heating length by 2 ft. to 20 ft. The original coal boxes were re-fitted to the new retorts by means of new cast-iron distance pieces, and the coke chambers at the bottom were also re-fitted. The twin gas producers were entirely rebuilt, the new producers being very much larger than the old ones. They are of the step-grate type without furnace doors, of 20 sq. ft. grate area.

The reconstruction has fully justified expectations. The output of the section has been increased by 40 p.ct., and the yield of gas per ton of coal increased from 77 therms to 85 therms, the declared value of gas being 440 B.Th.U.

The experience is interesting as showing how the reconstruction of older vertical retort plants can at least delay the expenditure of a large capital sum in extending the number of retorts to cope with a peak load period of a duration rather less than three months.

### GASHOLDERS.

The amount of storage capacity required relative to the peak 24-hours' output considered necessary for safe and efficient working has undergone considerable modifications during recent years. But majority opinion may still be held to favour 24-hours' storage capacity as a safe minimum. However, for several years we had to work with considerably less, but when in 1926 and 1927 we reached the stage of having storage less than 50 p.ct. of the daily output, the erection of a new holder could not be longer delayed. When about 1925 it became apparent that if the rate of expansion of gas consumption was continued, a new holder would be required, a suitable site was purchased about 500 yards, or thereabouts, east of, and on the same street as, the works. But in a residential district, however useful a gas supply may be considered, gas-works and gasholders are "disfigurements" and "ugly blots" on the landscape. Immediately the residents became aware of the purpose to which the Council intended to apply the ground there occurred the same vigorous objections of almost 30 years before. The amenity would be destroyed and house values decrease. The Council capitulated, and the search for a site had to begin all over again. Finally, a suggestion was made that if permission could be obtained to close part of the public

street separating the works from the holder station referred to previously, and to incorporate this street in the works, a new holder could be erected between the coal store and the existing holder. A Provisional Order was promoted successfully; the street closed to the public, and included in the works. There must be very few, if any, similar cases of public highways being closed to permit the extension of a gas-works.

The holder, which is of 500,000 c.ft. capacity, was erected in 1928. It is a three-lift, spirally-guided, in above-ground steel tank, 102 ft. diameter, and 25 ft. 6 in. high. The tank rests on a mass concrete foundation built on solid rock. Each lift is 25 ft. high.

As the details below will show, the holder is of specially heavy construction throwing pressures of 6 in., 9 in., and 12 in., according to number of lifts in use.

| —— | Inner Lift. | Middle Lift. | Outer Lift. |
|---|---|---|---|
| Diameter | 94 ft. 6⅞ in. | 97 ft. 3⅜ in. | 100 ft. |
| Side plates— | | | |
| Top and bottom rows | ¼ in. thick | ¼ in. thick | ¼ in. thick |
| Adjacent rows | 5/16 in. thick | 5/16 in. thick | 5/16 in. thick |
| Intermediate rows | No. 10 S.W.G. | No. 10 S.W.G. | No. 10 S.W.G. |
| Vertical stays (24 in each lift) | 10 in. × 5 in. × 30 lbs. R.S.J. | 8 in. × 3 in. × 19·3 lbs. R.S.C. | 8 in. × 3 in. × 19·3 lbs. R.S.C. |
| Number of spiral guide rails (41 lbs. per yard) | 12 | 16 | 20 |
| Cup | 10 in. × 3½ in. × 23·6 lbs. R.S.C. | 10 in. × 3½ in. × 23·6 lbs. R.S.C. | .. |
| Curb | 5 in. × 5 in. × ½ in. Top curb. | .. | 8 in. × 3½ in. × 22·7 lbs. R.S.C. Bottom curb. |

The crown frame consists of 24 main bars, and 24 intermediate bars, each of 4 in. by 4 in. by ½ in. T section, and trussed on the bow-string principle. There are six rows of purlins ranging from 2 in. by 2 in. by ¼ in. to 3 in. by 3 in. by 5/16 in.; 24 main tension rods are employed with adjusting turnbuckles. The crown sheeting is similar to the side sheets of the lifts.

There are now three holders, with a total storage capacity of 900,000 c.ft., while the record output of gas in 24 hours is 860,000 c.ft. Experience has shown that in medium sized gas-works using vertical retorts ample storage capacity is necessary to obtain the most efficient work from the retort plant.

### Distribution.

Rapid growth of consumption has brought with it many distribution problems. Two low-pressure trunk mains leave the works, a 15-in. supplying the Burgh, and a 9-in. supplying the outlying villages of Rhu and Shandon. No boosting is resorted to as holder pressure is adequate. The town is laid out in squares, and the system of mains similarly takes the form of a series of squares, the pipes being coupled at all the crossings. There are 22 miles of street, and the mains extend to 35 miles. A large programme of relaying mains has been carried out, including the laying of a feeder main, running north and south at the outer edge of the west end. An additional 12-in. main is being taken to meet this pipe, as the 15-in. outlet is reduced to 9 in. within a comparatively short distance of the works. The laying of the 12-in. main has been very costly, as a conglomerate rock has had to be blasted all the way, by no means a simple matter in a principal street. Pneumatic drillers were quite ineffective, as the rock hammered to powder, refusing to break off.

Less than 3 in. pressure at consumers' meters is not considered an adequate pressure, and the maintenance of this pressure at the outer ends of the system requires 6 in. of pressure at the works during the heaviest periods of draw, which are at the breakfast and evening dinner periods. Consumers near the works are therefore receiving some excess of pressure at these times, and the only way of overcoming such inequalities would seem to be the fixing at each consumer's meter of a cheap, simple, reliable governor, if such were obtainable. In our ideal system of distribution we think of higher pressures in all mains with the yet-to-be governor on every meter. The outlying district extends a distance of 6½ miles, following the north shore of the Gareloch. The total number of consumers in this district is 305, and between Rhu and Shandon, a distance of 3½ miles, the number of consumers is 53, the average distance of each house from the main being about 80 yards. The price charged for gas is 6·25d. per therm —0·57d. above the Burgh rate. Pressure charts are taken regularly in the Burgh and the supplementary area, and works pressures fixed in accordance with the information provided.

### Conclusion.

In conclusion, I wish to emphasize that there is much in the outlook for our industry to encourage hopefulness and confidence. In some directions things may not have shaped themselves as we could wish; but there is no necessity for gloom or despondency, feelings which seem all too prevalent in British industry to-day.

The virtues of courage and cheerfulness can overcome all difficulties, and, with enterprise and initiative in all ranks, our industry will go forward to a prosperity even greater than in any time past.

## Australian Window Display.

**This photograph is of a successful window display by the Maitland Gas Light Company, Australia. The "Eureka New World" cooker is the centre of attraction.**

# Register of Patents.

## Coke Ovens.—No. 302,365.

Koppers Company, of Pittsburgh (Assignees of Ackeren, J. Van, of Pittsburgh).

No. 30,988; Dec. 14, 1928. Convention date, Dec. 15, 1927.

This invention relates to coke oven batteries, and particularly to such batteries of combination ovens having crosswise regenerators beneath the ovens and in which the heating gases traverse certain of the flues of each heating wall and are returned as waste gases in other flues.

An object of the invention is to provide a battery of coke ovens in which the distribution of fuel gas and air within the battery is equalized by improved means to render heating conditions more nearly uniform, and wherein the distribution of waste gases is equalized in such manner as to heat the regenerators uniformly.

The invention comprises a coke oven battery having crosswise oven chambers and regenerators with heating walls between the chambers in which heating gases traverse certain of the flues thereof and are returned as waste gases in other flues, and also having horizontal longitudinal flues between the oven chambers and regenerators disposed lengthwise of the battery—*i.e.*, transversely of the oven chambers and regenerators—characterized in that the horizontal flues extend throughout the length of the battery and some of them connect a plurality of inflow regenerators to certain of the flues of each heating wall, for transmitting air, or air and fuel gas, thereto. The other horizontal flues connect a plurality of outflow regenerators to the other flues of each heating wall, and *vice-versa* upon reversal of the operating condition of the battery.

Horizontal brickwork separates the oven chambers and the heating walls from the crosswise regenerators. Within the horizontal brickwork and extending throughout the length of the battery are horizontal flues corresponding in number to the vertical flame flues. Each of the horizontal flues is connected to a plurality of the regenerators and also to one pair of flues of one group in each of the heating walls. Each of the regenerators is connected to a plurality of the horizontal flues, and accordingly the flues of each of the several heating walls are connected in parallel relation to each other, and the regenerators are also connected in parallel relation to each other. This arrangement, states the patentees, ensures that the distribution of fuel gas is equalized.

## Coke Ovens.—No. 315,847.

Koppers Company, of Pittsburgh (Assignees of Ackeren, J. Van, of Pittsburgh).

No. 26,092; Sept. 11, 1928. Convention date, July 20, 1928.

This invention relates to coking retort oven batteries and has for its object to provide an improvement in the oven described in patent No. 304,743. Briefly, this prior construction comprises a coke oven battery having coking chambers and heating walls alternating therewith, characterized by separate superimposed heating systems, each system comprising intake and offtake regenerators, and also two groups of flame flues connected together in series. A group of one system is disposed in superimposed relation with a group of the other system in the same heating wall. Combustible material is supplied to the respective heating systems so that each heating wall has the group of flues of one system burning combustible material and the group of the other system discharging waste gases.

According to the present invention the connnections between the regenerators and their respective flue groups, and the supply of the combustible media thereto, are such that the respective groups of flues of each system in the same heating wall both simultaneously convey either burning gases or water gases.

## Roller Carriages for Spiral Holders.—No. 326,680.

Blakeley, W., and Firth, Blakeley, Sons, & Co., Ltd., both of Church Fenton.

No. 10,750; April 8, 1929.

This invention relates to spirally-guided gasholders, and has for its object to introduce an improved construction of roller carriage which will prevent the rollers from sliding on the spirally arranged guide rails and getting flat places worn on them, will allow the rollers to move freely when the gasholder is subjected to distortion by wind pressures, will enable the roller axles to be automatically and efficiently lubricated, and in the case of large gasholders will provide additional support which will come into action when there is great swaying of the gasholder due to a gale.

The carriage is provided with intergearing rollers situated on each side of each spirally arranged guide rail, so that when the latter imparts rotary motion to one roller the other roller is rotated positively at the same time. To enable the rollers to move freely when the gasholder is distorted by wind pressures, each roller axle is capable of partaking of a limited amount of endwise movement which may be controlled by a ball bearing. For this purpose the roller axle may be formed with an annular recess to engage a ring of balls let into a groove formed in the bearing in which the axle is mounted, the annular recess in the axle being made sufficiently wide to permit the required endwise movement of the axle. The balls serve to connect the axle with the bearing, and they can be introduced and removed through a lateral opening in the bearing, the opening being fitted with a plug, or other suitable closure. Each axle is formed with a longitudinal oil passage which communicates with some intermediate portion of the bearing, and terminates at its rear end in a tube that dips with each revolution of the axle into an oil well formed in the bearing, and conveys a supply of lubricant to the latter. In the larger types of gasholders which are subjected to greater wind pressures, one or more additional rollers may be mounted on the carriage at opposite sides of the guide rail, to provide increased support on occasions when severe gales are experienced and when the gasholder is subjected to heavier strains than usual.

The number of rollers used on the different carriages may be varied.

## Hotplate Burners.—No. 326,441.

Barwolf, R., of Gera.

No. 25,780; Sept. 7, 1928.

Fig. 1 is a section through a complete cooking stove showing one form of burner and one form of detachable support.

Fig. 2 is a top view with some part omitted corresponding to fig. 1.

*Fig. 1.*

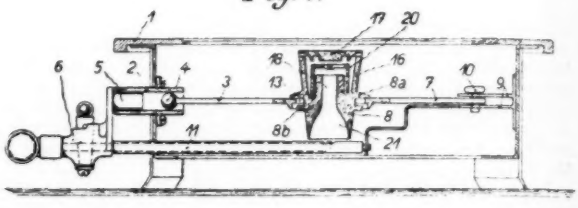
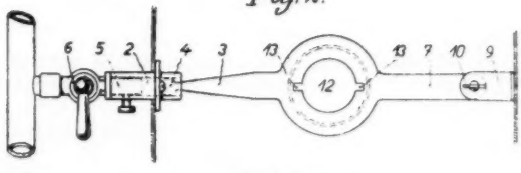



*Fig. 2.*




**Hotplate Burner.**

A burner body 8 having a mixing chamber 21 carries a slotted top plate 17 resting upon the upper edge of the upper part 16 of the burner, and below the top plate 17 is arranged a slotted hood 20 which surrounds a tubular internal portion 18 of the burner, through which the combustible mixture passes from the mixing chamber 21. When the top plate 17 is used, the flames issue through the slots of the plate and form a cooking flame of known kind. On removing the top plate the flames pass through the slots of the hood 20 and form a conical or wedge-shaped heating flame burning vertically. The burner is provided with a flange 8A by means of which it rests upon a removable support 3, 7 having a suitable opening 12 for the reception of the burner. The burner is also provided with radial projections 8B which register with corresponding slots 13 of the support, so that, by turning the inserted burner, a bayonet joint is obtained between the burner and the support.

The main frame 1 of the stove carries a tubular bracket 2 which serves on the one hand for the reception of a ball-shaped end of the support arm 3, and also serves for the reception of an extension 5 by means of which the gas supply pipe 11, together with the regulating tap, may be detachably fixed to the stove. The other end of the supply pipe 11 is detachably held in a bracket 9 fixed to the casing. The support arm 7 is also detachably fixed to the bracket 9 by means of a set screw 10 passing through corresponding openings in the bracket 9 and the arm 7. It will be seen, states the patentee, that the whole burner may be easily removed from the support, and that the top plate and the hood of the burner may likewise be easily removed. The supply pipe 11 may be easily removed by sliding out of the brackets 9 and 2, and the support 3, 7 may be easily removed by first removing the screw 10 and then sliding the support first into the tube 2 and then swinging it somewhat upwards and pulling it out of the tube.

## Applications for Patents.

**[Extracted from the "Official Journal" for April 9.]**

Nos. 10,109—10,926.

Pintsch Akt.-Ges., J.—"Dry gas meters." No. 10,908.

Rude, J.—"Dry-cooling coke." No. 10,925.

Smith, F. G.—"Charging coke ovens." No. 10,328.

Wellman, Smith, Owen Engineering Corporation, Ltd.—See Smith, F. G. No. 10,328.

# New Installation of Glover-West Retorts at the Municipal Gas and Electricity Works of Brno, Czechoslovakia.

By Ing. Dr. techn. Frant Perna.

(*Concluded from p. 154.*)

The retorts are heated to the required temperature by means of producer gas which is generated in built-in producers of the water-cooled step-grate type arranged along one side of the retort bench. The producer-gas generators are fed with coke once every four hours, the necessary coke being stored in a hopper near the level of the coal bunkers at the end of the retort bench. From this hopper the coke is wheeled in hand wagons to the producer firing doors and allowed to flow into the individual producers. All clinker-formation is removed from the producers once every twelve hours. The producer grates are quite open, and possess no doors for the regulation of the primary air. In reality the amount of primary air drawn in is controlled by regulation of the waste-gas dampers. Since the producers are very amply dimensioned, the passage of the primary air through the fire zone is slow and regular, and the reduction of carbon dioxide and of steam is complete. The producer gas has the following average composition.

| — | An Hour Before Clinkering. | Six Hours After Clinkering. | An Hour After Clinkering. |
|---|---|---|---|
| | P.Ct. | P.Ct. | P.Ct. |
| $CO_2$ | 2·9 | 4·3 | 6·5 |
| $O_2$ | 1·9 | 1·1 | 0·8 |
| CO | 26·1 | 24·0 | 21·2 |
| $H_2$ | 6·8 | 7·2 | 9·3 |
| $N_2$ | 62·3 | 63·4 | 62·2 |

The producer gas passes out of the generators into vertical uptakes arranged in the front wall of the settings and each uptake feeds seven horizontally superimposed combustion chambers with the necessary fuel gas. Each combustion chamber is connected with its respective producer-gas uptake through a so-called nostril, and each nostril is fitted with a fireclay damper, by the opening or closing of which the entry of producer gas is properly regulated.

The secondary air necessary for the combustion of the producer gas is drawn into a series of vertical air uptakes arranged in the non-producer walls of the settings. From each vertical uptake for secondary air seven horizontal air channels branch off to conduct the air right through the dividing walls to the producer side of the settings, where it is led into the various combustion chambers near to the producer gas nostrils by means of the so-called air ports. A special West damper is provided in the side-wall of the settings to each of the individual air channels, so that the amount of secondary air admitted to each combustion chamber can be regulated and controlled. During its passage through the above-mentioned system of channels the secondary air is partly pre-heated. The producer gas burns in the combustion chambers in contact with the walls of the retorts, and the products of combustion are collected in vertical flues arranged at the opposite end of the combustion chambers. The waste gases are then circulated round the upper portions of the retorts, to pre-heat the incoming coal. Leaving the settings, the waste gas is then drawn into a main waste-gas flue leading to the superheater chamber and waste-heat boiler. Passing through the latter the heat of the waste-gas is recovered in the form of steam, and the gases are then discharged through a fan to the atmosphere. When the waste-heat boiler is put out of operation, whether for scaling or for any other reason, the waste gases can be delivered to atmosphere under the natural draught supplied by a reserve chimney.

Due to the ingenious method of heating the retorts it is possible to maintain the retorts at a uniformly high temperature throughout their whole length, or to apply a zone of maximum temperature over any particular portion of the retorts, whichever is most suited to the characteristics of the coal to be carbonized. When carbonizing an Ostrava large coal the settings are regulated to give comparatively low temperatures in the bottom combustion chambers, not much more than 950° C., and to maintain 1200° C. in the second to seventh combustion chambers inclusive. Since the coal in the retort does not remain fixed in one position, it is not necessary in this system to maintain the whole length of the retorts at a maximum high temperature. It suffices for the middle and lower portions to be maintained at a good temperature. In the upper portions of the retort the coal is first pre-heated and then subjected to a low-temperature distillation. Sinking lower, the coal is gradually raised through an ever-increasing temperature until, in the middle and lower portions of the retort, it is completely carbonized at over 1200° C.; hence the high makes of gas.

In the Brno installation the temperature of the waste gases leaving the settings is comparatively high, so that it is a commercial proposition to utilize waste-heat boilers for the recovery of the heat of the waste gases in the form of steam. The waste-heat boiler is of the Spencer-Bonecourt patent type and possesses a heating surface of 216 sq. m. (2325 sq. ft.). When all retorts are in operation the boiler is capable of evaporating 2550 kg. (5620 lbs.) per hour from and at 100° C. The normal working pressure of the boiler is 8·5 kg. per sq. cm. (120 lbs. per sq. in.), but the steam passes through a superheater to be raised to a final temperature of 250° C. The waste gases leave the boiler

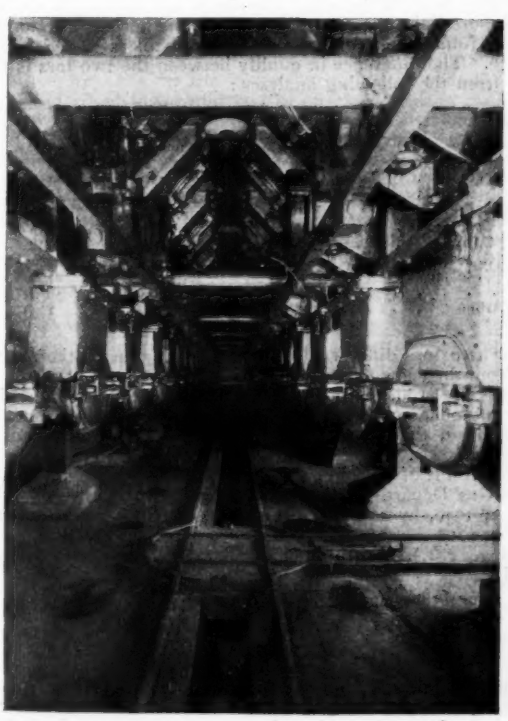


Fig. 3.—Coke Discharging Doors of the Glover-West Vertical Retorts.

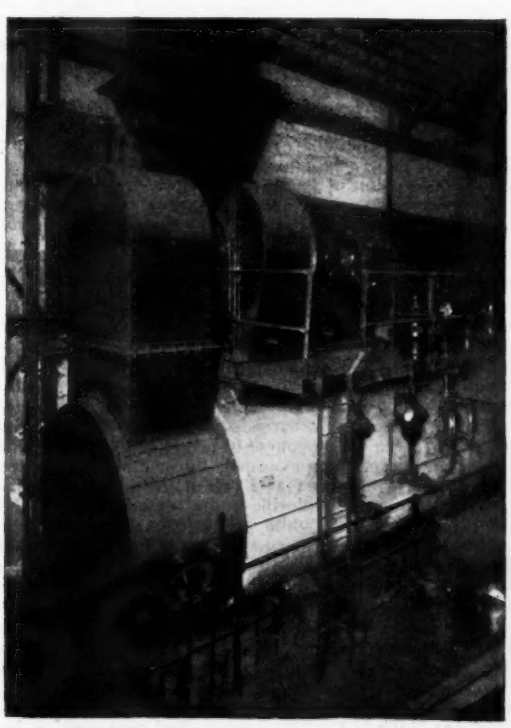


Fig. 4.—Spencer-Bonecourt Waste-Heat Boiler.

Fig. 5.—The West Lip-Bucket Conveyor.

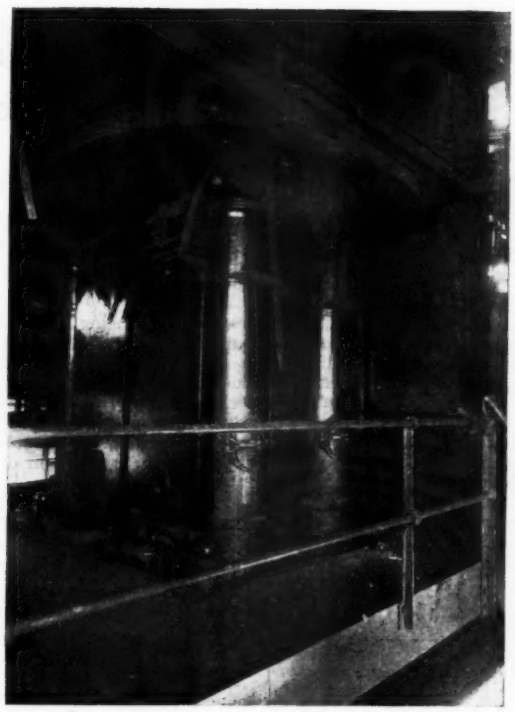


Fig. 6.—Top Mouthpieces, Gas Offtakes, and Coal Feed to Retorts.

with a temperature of 180° C. and are exhausted to atmosphere by a fan operated from a 28·5-H.P. electric motor. A number of tests have shown that the average production of steam (with only sixteen retorts in operation) amounts to 3·6 kg. per 1 kg. of coke actually consumed in the producers. The steam raised in the waste-heat boiler is utilized for cooling the coke at the bases of the retorts and for the simultaneous production of water gas in the retorts, but this only consumes about one-fifth of the total steam produced. The superfluous steam is used for the ammonia plant, for the heating of offices, workshops, and the gasholders, and for general purposes, so that the whole requirements of the gas-works are covered by steam from the waste-heat boilers. For this reason we have been able to close down the ordinary boiler installation which previously generated steam for the works.

The whole of the work in connection with the carbonizing plant is carried out by eleven men per 24 hours. In the retort-house are three stokers per shift, the first for discharging the retorts every two hours, the second for feeding and cleaning the producers, while the third controls the hourly feeding of coal to the retorts, rods the charges, and attends to the waste-heat boiler. Apart from the foregoing, but on the day shift only, a crane driver and a handyman for the cleaning and oiling of machinery are employed.

In taking over the order, the English Company guaranteed that, when carbonizing a large coal from the Nová Jáma or Bettina mines of the Ostrava coalfield containing 3·73 p.ct. moisture, 4·55 p.ct. ash, and 31·33 p.ct. organic volatiles, the maximum production of gas per retort per 24 hours would not be less than 1930 cub.m. (68,200 c.ft.), that the following minimum makes per 100 kg. of coal would be achieved: 40 cub.m. of gas with a calorific value of 4925 to 5000 kg.-calories per cub.m., measured dry at 0° C., 760 mm. hg. (14,350 c.ft. per ton at 516 to 524 B.Th.U. per c.ft. 60° Fahr., 30 in., hg., moist) 64·4 to 65 kg. of coke (64·4 to 65 p.ct.) 5 to 5·5 kg. of tar (112 to 123 lbs. of tar per ton of coal). The fuel consumption per 100 kg. of coal carbonized was not to exceed 13 kg. (13 p.ct.) when taking into account the coke carried away in the ashes, and not to exceed 14·6 kg. (14·6 p.ct.) when ignoring the coke in the ashes. The whole of the foregoing guarantees were not only achieved but considerably exceeded, and this not only during the tests but in the whole course of ordinary daily operation up to the present time. For example, the actual average results for November, 1929, were: 44·2 cub.m. of gas per 100 kg. of coal, the gas having a calorific value between 4910 and 5140 kg.-calories per cub.m., while producing 1989 cub.m. per retort per day. (15,860 c.ft. per ton at 514 to 538 B.Th.U. Make per retort 70,240 c.ft. per day.) The fuel consumption, converted to a basis-make of 40 c.m. per 100 kg., amounted to 14·02 p.ct. gross and 12·05 p.ct. net. The average make for December, while producing an average of 1845 cub.m. (65,160 c.ft.) of gas per retort per day, amounted to 40 cub.m. per 100 kg. of coal, the gas having an average calorific value of 5160 calories (14,350 c.ft. per ton at 540 B.Th.U.). The calorific value actually varied between 5020 and 5290 calories (526 and 554 B.Th.U.). The average fuel consumption in December did not exceed 14·98 p.ct. gross or 12·88 p.ct. net. In this connection it is to be noted that the average composition of the coal carbonized was by no means as good as that agreed to in the contract. In November it contained an average of 4·9 p.ct. moisture and 6·7 p.ct. ash, and in December 5·4 p.ct. moisture and 7·8 p.ct. ash.

The high emciency of the Glover-West retorts becomes much more marked when they are compared with the old carbonizing plant. From the old plant only 30 to 35 cub.m. of gas (mixed coal gas and Doppel-gas) with an average gross calorific value of 5350 calories per cub.m. were obtained per 100 kg. of coal (10,760 to 12,560 c.ft. per ton of 560 B.Th.U.).

For this make a fuel consumption of 18·5 p.ct. net was necessary. The production of gas per man-shift in the old plant was 450 cub.m. (15,900 c.ft.), whereas the new plant, with 16 retorts working, gives 3100 cub.m. (109,500 c.ft.) per man-shift, and will give 4230 cub.m. (149,400 c.ft.) when all 24 retorts are in operation.

In connection with the bye-products must be mentioned that the makes of tar and ammonia are higher in the new plant than they were in the old. The tar is not so viscous, but contains more light oils than the tar from the horizontal retorts, so that it fulfils the demands of the tar-distillers to a far better degree. The difference in quality between the two tars is to be seen from the following analyses:

| — | Horizontal Retort Tar. | Glover-West Tar. |
|---|---|---|
| Specific gravity at 15° C. | 1·2303 | 1·0894 |
| Water (weight) | 3·6 p.ct. | 1·9 p.ct. |
| Fractionation— | | |
| 0° C. to 170° C. | 1·6 ,, | 2·8 ,, |
| 170° C. to 230° C. | 4·0 ,, | 11·2 ,, |
| 230° C. to 270° C. | 10·0 ,, | 12·4 ,, |
| 270° C. to 340° C. | (cracked) | 21·0 ,, |
| Pitch | 80·8 p.ct. | 50·7 ,, |
| Free carbon | 25·1 ,, | 1·33 ,, |

The two tars differ radically from each other although they are from the same class of coal.

The coke produced in the Glover-West retorts is light, silver-grey, porous, and free from water, but is otherwise not different from that produced in the horizontal retorts from the same coal.

As a result of the foregoing economies in gas-production, the Brno Gas Department were able to reduce the price of gas on Jan. 1, 1930, by 20 heller per cub.m. (8·25d. per 1000 c.ft.), so that gas for cooking now costs 1·3 crowns per cub.m. (4s. 5¾d. per 1000 c.ft.). Furthermore, the following rebates are now valid:

| | | | |
|---|---|---|---|
| Annual consumption | 1,001 to 2,000 cub.m. | . . . | 10 p.ct. |
| ,, ,, | 2,001 to 5,000 ,, | . . . | 15 ,, |
| ,, ,, | 5,001 to 10,000 ,, | . . . | 20 ,, |
| ,, ,, | 10,001 to 20,000 ,, | . . . | 30 ,, |
| | above 20,000 ,, | . . . | 40 ,, |

Commercial and industrial concerns which utilize gas exclusively for all heating processes and consume not less than 3000 cub.m. (106,000 c.ft.) of gas per annum are charged one crown per cub.m. (3s. 5¼d. per 1000 c.ft.).

# Notes on Road Tar.

By Philip B. Nicholson.

**[Paper before the Midland Section of the Coke Oven Managers' Association, Sheffield, Feb. 27.]**

No less than 3,400,000 tons of coal are carbonized in South Yorkshire in coke oven plants. Approximately 150,000 tons of tar are produced, and up to the present time the greatest proportion of this material has been distilled into oils and pitch. In November, 1927, the value of these products obtained from one ton of crude tar was £4 15s. per ton. In November, 1929, the value of tar products obtained from one ton of crude tar was £2 7s. 6d. It is a matter of regret that this valuable material for road purposes has not been manufactured into refined tar.

The tars produced at the present time in this country may be classed under three headings:

1. Horizontal retort tar.
2. Coke oven tar.
3. Vertical retort tar.

No. 1 is the heaviest and most viscous, containing a low percentage of oils and a high percentage of pitch and also the highest percentage of free-carbon.

No. 2 may be said to occupy an intermediate position, being lighter, containing more oils, less pitch, and less free-carbon than the preceding tar.

No. 3 is still lighter, less viscous, contains more oils, less pitch, and usually less free-carbon than coke oven tar.

Suitable refined tars can be made from either No. 1 or No. 2 alone, but it is not possible to manufacture suitable road material from No. 3 alone; it is utilized when mixed with No. 1 or No. 2.

From the surveyors' point of view, No. 1 and No. 2 are heavy tars, and the vertical tar a thin tar, and in many respects their conclusions regarding the superior properties of the heavier tars are justified, because they are the most viscous, and where the higher consistency tars are used (more in keeping with the physical properties of bitumen) for spraying purposes, the road so treated will not require any further treatment for at least two years. It is unfortunate that owing to the use of No. 3 tars, some leading surveyors are prejudiced against tars in general. For example, the City Surveyor of Sheffield, as recently as October last, stated that the reason he did not use tar was that tar was not as stable a material as bitumen. Tar was influenced by the weather, would not survive more than a winter in an ordinary road; it did not always survive as long as that where there was a considerable amount of traffic. The inability of certain producers to procure orders from the W.R.C.C. in the past has been due, to a certain extent, to the irregularities in the quality of tar supplied to that authority.

Communications having been received from representatives of gas undertakings in the West Riding of Yorkshire complaining of their inability to secure orders from the West Riding County Council, a meeting was held at Leeds in 1927. It appears that the Highway Authority had shown a marked preference for a competitive material at a much higher price than that asked for tar. In the discussion that followed, the importance of supplying a material in strict conformity with requirements was stressed, and it was pointed out that irregularities in the quality of tar supplied to this authority in the past (particulars of which were shown to the members present) had no doubt contributed to the present position.

My contention is in part also supported by one of the two leading gas companies, who advertise their tar as "Carefully standardized product, prepared from pure coal gas tar resulting from the carbonization of coal in horizontal retorts only."

### A Statement for Bitumen.

The following statement has been made by the bitumen interests supporting the hostile attitude of certain leading surveyors regarding a road made in Scotland in 1916: "Experience gathered 14 years ago is of little value to-day, as since that time the quality of tar has deteriorated because the processes of coal treatment which yield the highest proportion of gas per ton of coal, unfortunately also yield the worst quality tar," but I have been unable to find that any surveyor using tar prepared from horizontal retorts or coke ovens has ever had cause for complaint.

The utilization of Nos. 1 and 2 tars in the manufacture of road material has been shown in the U.S.A., where road materials are manufactured mainly from coke oven tar, there being very little vertical retort tar produced in that country; and through quality, advertisement, and service, 1d. per gallon more is paid by surveyors for tar than for bitumen.

In the U.S.A. 50 million gallons of gas retort tar are produced (mostly horizontal), and 470 million gallons of coke oven tar compared with 200 gallons of coke oven tar, 120 million gallons vertical tar, and 80 million gallons horizontal tar in this country, and approximately one-third of our total production of tar is used for road construction and maintenance. You have the most suitable material, and I suggest to you that you should consider the question of advertising, service, and marketing the product.

This can only be brought about by the co-operation of those producing coke oven tar, and one might take a leaf out of the book of the leading firm in the U.S.A. who have created such an excellent organization in that country during the past 15 years.

Their success has been brought about by:

1. Developments of grades of tar to meet practically every system of highway construction and maintenance, each specification is rigid in its requirements and is within a narrow range of prescribed limits, which tends to uniformity and can therefore be expected to give good results.
2. Under the heading of service, skilled engineers are available for consultation by surveyors, with reference to their road problems.
3. Advertisement is practised on an extensive scale, the products having a registered trade mark.
4. Distribution is carried out by modern methods which not only save local authorities a considerable amount of money, but, at the same time, save the surveyor much trouble.

From the experience of a distributor by these methods in England, the cost of filling, putting into barrels, freightage, delivery to site from station, heating, and spraying — 1⅜d. per gallon, equals 22s. 1d. per ton. The cost of spraying by road tank, equals 7s. 9d. per ton (½d. per gallon). There was in each case a distance of 25 miles from works. This shows a saving of 14s. 4d. per ton.

### Work of the "B.R.T.A."

With regard to advertising, the British Road Tar Association is doing excellent work in general with the funds they have at their disposal, but the amount expended is not to be compared with the amount expended by the bitumen interests in advertising proprietary materials registered under a trade mark, and for the week ended Feb. 5, the compared amounts expended in advertisements in technical papers have been calculated as 5 to 1.

The British Road Tar Association, as you will be aware, is accepted in this country as the body that speaks on behalf of the tar industry as a whole, and it is to be regretted that lack of support from the coke oven people practically places the control of its policy in the hands of the tar distillers and the gas industry.

Mr. Gordon Adam, in his paper "Distilled Tar for Roads," stated that the specification which is likely to be generally accepted as necessitating a good quality is a little complicated, and the following which is based upon experience may be relied upon to give a first-class article well worth its extra cost. (Specification is given on p. 297 of the Coke Oven Managers' Year Book, 1928). In Mr. Gordon Adam's opinion, these specifications should be embodied by every surveyor in every tender form calling for a refined tar for any but the most temporary and repair work. Mr. W. J. Chadder agreed with Mr. Adam that it would be difficult to produce road tar to the proper specification from vertical retort tars; in fact, it would be practically impossible to prepare road tar by a straight distillation from such tars.

With regard to co-operation in this country, certain steps in this direction have already been taken, and in the gas industry various schemes exist in which the producers of tar—*i.e.*, the gas companies—share in the realized profits from the sales of the products of distillation, and in certain areas some coke oven tar producers are associated with these enterprises. Lack of knowledge of the value of coke oven tar compared with vertical retort tar has resulted, however, in certain producers of the former entering into co-operative schemes whereby they only receive the same value as inferior quality tar.

Owing to the installation of more vertical retorts in gas-works, causing a reduction in the amount of horizontal tar which has hitherto been at their disposal, energetic efforts are now being made by certain tar distillers to obtain more coke oven tar by endeavouring to persuade the producers to become members of co-operative schemes.

Recently I received a communication from the U.S.A. from a firm who utilize horizontal retort and coke oven tar only in their manufacture of road materials. It states:

> There are no mixtures of tar and asphalts being sold for highway use in the United States. Experiments conducted over a period of years have demonstrated that such mix-

tures have no advantage over straight-distilled tar products. In some instances, mixtures were decidedly inferior. The addition of asphalt to tar causes tar to lose its adhesiveness, and stone chips and grittings are not held so readily on the surface. Mixtures were found to be more slippery and more apt to push and move on the road surface, in direct proportion to the amount of asphalt added to the tar. Attached are technical specifications for tars which meet with every requirement for road construction. It will be noted that these specifications can be fairly readily met, providing proper materials are used and reasonable care taken in manufacture. We should be glad to give you any advice or assistance that you may require.

In conclusion, I suggest that owners of coke oven plants in South Yorkshire co-operate and form a Board which should join the British Road Tar Association. This Board should be entirely free, directly or indirectly, from the gas or tar distilling interests and that an organization be formed in order to market coke oven tar under a registered trade mark and obtain for it its true value—that is, equal to the price obtained for bitumen—which will mean increasing the value of the products obtained from the coal carbonized in coke ovens.

# Interpretation of the Results of Chemical Analyses for Gas-Works.

By WILLIAM SCOTT, Assistant Manager, Alloa.

**[From a Paper before the Scottish Junior Gas Association (Eastern District), April 5.]**

Of the chemical analysis of coal, the coke, ash, water, sulphur, and nitrogen are the principal estimations, the volatile matter giving little information. The water, ash, and sulphur contents should be low, as these constituents are inerts, and their presence has a deteriorating effect on the gas and residuals produced. On analysis, a coal may yield the following results: Coke 59 p.ct., ash 4·8 p.ct., water 3·5 p.ct., volatile sulphur 0·5 p.ct. Glancing at these results, one would regard the coal as being fairly good; yet even such a coal shows the presence of 9 p.ct. of inerts, material which is of no value to the gas engineer, while 4·8 p.ct. of ash in the coal indicates the presence of 8·1 p.ct. of ash in the coke. Further, the presence of water has a tendency to form carbon dioxide during distillation of the coal, also to help in the liberation of sulphur. The presence of sulphur must be taken into account with regard to purification costs, as a fairly large amount, approximately 30 p.ct. of the volatile sulphur, comes off in the form of hydrogen sulphide. The nature of the ash should next be examined. If the ash contains any considerable amount of iron, lime, and magnesia, it will have a tendency to form clinker when the coke is burned in the producers, &c., as the presence of these constituents considerably reduces the fusibility of the ash. Of the nitrogen in coal, 17 p.ct. of the total quantity is an approximate amount which may be obtained as ammonia, the bulk of the remaining nitrogen being found in the coke.

In the analysis of coke, water, ash, and arsenic are the main considerations, the amount of volatile matter very rarely being such as to warrant attention. The moisture content should be low, this being an inert constituent, its presence also having the effect of darkening the coke, which may be considerably reduced in value thereby.

Gas analyses furnish very interesting results, and much information may be obtained from them. We know that the unsaturated hydrocarbons and methane are the chief constituents in coal gas, having a calorific value of 2500 and 1018 B.Th.U. per c.ft. respectively, while hydrogen and carbon monoxide have a calorific value of 330 B.Th.U. per c.ft. Typical analyses of straight coal gas and vertical retort gas using steam are as follows:

| — | Straight Coal Gas. | Vertical Retort Gas. |
|---|---|---|
| | P.Ct. | P.Ct. |
| Carbon dioxide | 3·0 | 4·5 |
| Unsaturated hydrocarbons | 4·5 | 2·0 |
| Oxygen | 0·2 | 0·2 |
| Carbon monoxide | 12·0 | 16·0 |
| Methane | 26·0 | 20·0 |
| Hydrogen | 45·0 | 50·0 |
| Nitrogen | 9·3 | 7·3 |
| | 100·0 | 100·0 |

Calculating the calorific value of the above gases, we find that the straight coal gas gives 566 B.Th.U. per c.ft., and the vertical retort gas 472 B.Th.U. per c.ft. It will be seen that the difference of composition is due to increase of carbon monoxide and hydrogen, and decrease of the unsaturated hydrocarbons and methane in the vertical retort gas, these differences accounting for the decrease of roughly 100 B.Th.U. per c.ft. Steaming in the retorts, while reducing the quality of the gas, increases the yield and the therms per ton of coal. It must be remembered, however, that a certain amount of coke is consumed to give the extra make of gas. From the Gas Investigation Committee's Report it is learned that for each additional 6570 c.ft. of gas made beyond the yield of straight coal gas, 1 cwt. of coke is consumed.

In the analysis of sulphate of ammonia, the percentage of nitrogen and equivalent ammonia and sulphate of ammonia, free acid, insoluble matter, and moisture are estimated. The percentage of nitrogen present fixes the price of the sulphate of ammonia, and it regulates the quality and value of the salt produced. It is necessary to have the sulphate of ammonia as pure and dry as possible, and frequent analyses of the make furnish the only means of keeping the salt up to standard. The free acid is a very important factor in sulphate of ammonia. As sulphuric acid is hygroscopic, it is impossible to obtain in a perfectly dry state a salt containing free acid. Also, the presence of free acid tends to cause caking.

Purifying material is analysed for the percentage alkalinity, moisture, iron oxide, and organic matter. As the action of iron oxide for purification depends on a form of hydrated oxide, of which oxides there are a number, it is impossible to tell from a chemical analysis how the oxide may act in the purifier. The analysis, however, gives us information regarding the constitution of the material. The oxide should be damp, the water content ranging between 20 and 30 p.ct., as the presence of water is necessary for the reactions between the iron oxide and hydrogen sulphide to take place. If, however, too much water is present, the material becomes inactive, owing to the particles of oxide being covered by a film of water. Also, water in excess leads to back-pressure in the purifiers. The iron oxide in a good purifying material is in a very fine state, and the presence of organic matter is necessary in order to keep the oxide in an open condition, thus giving an easy passage for the gas through the material. The organic matter at the same time acts as a reservoir, being able to absorb and retain a fair amount of water. The oxide must have an alkaline reaction if the activity of the material has to be maintained. Under alkaline purifying conditions, sulphides of iron are formed which can be oxidized back into iron oxide and sulphur, but if the oxide becomes acid, other sulphur compounds of iron are formed which are incapable of being oxidized back into iron oxide—in other words, they can be regarded as dead material, and the oxide of iron itself of no further use for purification. In this connection it is common practice to allow a quantity of ammonia to go forward with the gas from the scrubber to the purifiers, but the quantity should be regulated, as every 1·07 grains of ammonia per 100 c.ft. of gas which passes from the scrubber entails a loss of 0·095 lb. of sulphate of ammonia per ton of coal carbonized, assuming a make of 16,000 c.ft. of gas per ton of coal carbonized. The percentage of iron oxide is estimated in order to obtain an indication of the available amount of likely active material in the oxide, as oxide is generally sold according to the amount of iron oxide present. This generally runs about 30 to 40 p.ct. in bog ore, on the wet basis.

### Discussion.

The PRESIDENT (Mr. J. Scobie), in regard to sulphate of ammonia, said he considered the drop in price, with a corresponding rise in the cost of acid, was a serious matter; and it was for the chemist to apply his knowledge in this direction with a view to cutting-down expenses.

Mr. D. GARRIE (Burntisland) considered that Mr. Scott stressed the chemical side too much, and that a check should be made on the physical side. For example, the composition of coke with regard to porosity and size, and also the specific gravity of the gas had been forgotten. Referring to sulphate of ammonia, he thought the chemist should apply himself to the physical nature and size with regard to grading.

Mr. STORRIER (Dundee) agreed with Mr. Scobie that the critical stage had been reached in regard to sulphate of ammonia.

Mr. SCOTT, in reply, said he considered that simple chemical analysis on coal gave very little information. For efficient working, gas and oxide routine tests were essential.

# Coal Tar Dehydration and Distillation on a 360-Million Works.

By J. M. DOW, of Perth.

**Scottish Junior Gas Association (Eastern District), April 5.**

Having described the layout of the plant of the Perth Gas Department, the author went on to say that dehydration is performed solely by a 30-ton per diem Wikner patent dehydrator. This plant was installed fully six years ago by Messrs. W. C. Holmes & Co., Ltd., of Huddersfield, being one of the very first introduced into Scotland. The outer casing takes the form of a rectangular steel shell about 6 ft. deep and 14 ft. long, having manlids for inspection of the interior, and at one end a large cover plate for the removal of internal fittings. The tar occupies about 4 ft. depth of the casing; and running horizontally immediately below the surface is a series of straight 1-in. steam pipes expanded into end plates. Steam chests are fixed over the projecting ends, and these are fitted with steam traps of the continuous type. The tubes are arranged for individual withdrawal. Steam is supplied by a 3-in. diameter connection.

Tar is fed to the plant by a small Evans reversible flow steam pump, the rate of flow through the still being set and kept steady by a constant head overflow device. The tar offtake takes the form of two **U**-shaped seal pipes, the tar being made to flow through a common sight-feed to the storage tank.

The water and naphtha vapours evolved collect above the tar surface and pass away through zigzag coils immersed in the tar in the still itself. In this way the tar is pre-heated slightly, and the vapours partially condense. A water-cooled condenser further settles out the condensates, but working under normal conditions with a tar containing not more than 4 p.ct. water, this is not essential.

Table I. is a copy of a recent test prepared on the Wikner apparatus, and tends to show how well it maintains the efficiency guaranteed by the patentees.

thermograph recording thermometer, calibrated to record temperatures up to 500° C., also at the condenser outlets are fixed suitable oil separating boxes designed to give a constant reading of the gravity of the distillers without the removal of the hydrometer.

Much discussion could be raised as to the method of controlling a distillation, but two items must be considered:

(1) The tar to be produced must comply with the Government specification.
(2) And within the limits of this specification it must comply with the buyers' requirements.

To prepare No. 1 or No. 2 road tar, in accordance with the Government specification, is not too difficult a job, and may be prepared by a straight distillation, but when the surveyor comes along and requires either of these tars at his own specified viscosity, it often requires a lot more careful handling.

Much can be learned from the thermograph, and this method brings things more into alignment with laboratory practice. Others may hold that by keeping check on the "gravity" of the distillates better results are obtained.

In Perth our experience has been that both are subject to variations which are sometimes alarmingly out of expectations. It is a well-known fact that coal tars vary greatly in character and composition according to the nature of coal being carbonized, and the conditions in the retort house. Keeping in mind that our source of coal supply is drawn over a wide area, and that it is the gas yield which is of primary importance, we have endeavoured to stabilize our distillation factors by concentrating on time of distillation. This is greatly facilitated by using dehydrated tar.

The stills are charged late in the afternoon and a slow heat is

TABLE I.—*Wikner Still.*

| Date. | Test No. | Time. | Steam Pressure on Inlet Steam Chest. Lbs. per Sq. In. | Tar Flow. | | | Distillate Flow. | | Steam Consumption. | | Tar Outlet Temperature °C. | Percentage Water in Tar. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Dehydrated Tar. Galls. per Hour. | Crude Tar. Galls. per Hour. | Crude Tar. Tons per Diem. | Water. Galls. per Hour. | Naphtha. Galls. per Hour. | Lbs. per Hour. | Lbs. per Ton. | | Crude Tar. | Treated Tar. |
| 2/4/30 | 1 | 10.30 a.m. | 60 | 270 | 284 | 32·5 | 10·3 | 3·50 | 212 | 163 | 135 | | |
| | 2 | 11.0 ,, | 60 | 270 | 284 | 32·5 | 9·9 | 3·60 | 218 | 168 | 130 | | |
| | 3 | 11.30 ,, | 60 | 270 | 281 | 32·4 | 8·1 | 2·82 | 220 | 169 | 135 | | |
| | 4 | 12.0 noon | 60 | 270 | 280 | 32·4 | 8·1 | 1·98 | 212 | 163 | 132 | | |
| | | Average | 60 | 270 | 282 | 32·45 | 9·1 | 2·98 | 216 | 166 | 133 | 7·6 | 0·15 |
| | 5 | 2.0 p.m. | 61 | 270 | 279 | 32·4 | 7·56 | 1·62 | 191 | 147 | 131 | | |
| | 6 | 2.30 ,, | 58 | 270 | 277 | 32·4 | 5·04 | 1·80 | 178 | 137 | 133 | | |
| | 7 | 3.0 ,, | 60 | 270 | 278 | 32·4 | 5·76 | 2·16 | 178 | 137 | 132 | | |
| | 8 | 3.30 ,, | 61 | 270 | 276 | 32·3 | 3·60 | 2·34 | 173 | 133 | 132 | | |
| | | Average | 60 | 270 | 278 | 32·4 | 5·39 | 1·98 | 180 | 139 | 133 | 4·6 | 0·30 |

Ammoniacal liquor = 6 oz. = 1·3325 p.ct. free $NH_3$.
0·0340 p.ct. fixed $NH_3$.

Sp. gr. of crude tar, 1·080 . . . 60° Fahr.
Sp. gr. of dehydrated tar, 1·090 . 60° Fahr.
Sp. gr. of light oil, 0·985 . . . 60° Fahr.

The following points garnered from the working of the plant are worth noting:

(1) The almost total elimination of frothing or priming in the still—a fault very common to vertical retort tars containing more than 2 p.ct. water.
(2) The distilling of dehydrated tar reduces time of distillation to approximately half of the time required on working straight from a crude tar; hence a saving in fuel consumption on the stills.
(3) The freedom from fire risk, and the continuous working without direct supervision of a still man.
(4) Finally, should the chloride content of a crude tar be high, this is generally arrested in the dehydrator, which may be periodically emptied and steamed out. Hence, the arresting of the chloride here reduces very considerably the rate of corrosion in the finishing stills. At the same time, the temperature of the dehydrator is not sufficiently high to permit of a heavy corrosion from ammonium chloride on the steam-heated tubes.

## DISTILLATION.

Two producer gas fired 5-ton pot stills complete the distillation plant. Tar may be fed from (1) the crude tar storage tanks; (2) the dehydrated tar storage tank; or (3) direct from the Wikner itself. Both stills are fitted with a "Cambridge" maintained on the charge overnight by damping down. The temperature of the distillates at the still head seldom varies much from the 100° C. line.

In the morning full damper is given, and the distillation of a No. 1 or No. 2 tar is completed within from two to three hours. In this way it is possible to run four stills per 11-hour day throughout the busy season. If, on the other hand, the stills charged in the morning have to be raised from the cold, five to six hours are required for the same tars; hence only two distillations can be expected per working day. Under this system a cut-point of 240° C. (equivalent to an oil cut-point of 0·970 at 60° Fahr.) produces a straight No. 1 tar, while a 265° C. cut-point (equivalent to an oil cut-point of 0·985 at 60° Fahr.) stands good for a No. 2 tar.

## THE PHENOL PROBLEM.

In Perth the crude tar contains on an average 10 p.ct. phenol. Government specification limits its presence to 5 p.ct. for a No. 1 tar and 4 p.ct. for a No. 2, on account of the fact that, although phenol is but sparingly soluble in water, it is known to have been washed from a newly tar macadamized road into wayside fishing rights and to injure the fish. Now, as is shown in the aforementioned analysis, phenol has been somewhat of a problem at Perth ever since the introduction of vertical retorts. Two methods seem available for dealing with the

TABLE II.—*Perth Corporation Gas Department.*

[Result of Distillations of No. 1 and No. 2 Straight Tars.]

| Requirements. | 17/2/30. | | 18/2/30. | |
|---|---|---|---|---|
| | No. 1. 240° C. | No. 1. R.D.S. | No. 2. 265° C. | No. 2. R.D.S. |
| Sp. gr. at 15° C., not lower than | 1·112 | 1·110 | 1·120 | 1·120 |
| ,, ,, not higher than | .. | 1·225 | .. | 1·240 |
| Water or ammoniacal liquor, not more than | trace | 0·5 p.ct. by wt. | trace | 0·5 p.ct. by wt. |
| Other distillate before 200° C., not more than | 0·958 p.ct. | 1·0 ,, ,, | 0·13 p.ct. | 1·0 ,, ,, |
| Distillate between 200° and 270° C. | 15·31 ,, | 9·5–21 ,, ,, | 11·56 ,, | 8·0–16 ,, ,, |
| ,, ,, 270° and 300° C. | 10·76 ,, | 3·5–12 ,, ,, | 9·24 ,, | 3·5–12 ,, ,, |
| Phenols, not more than | 6·66 ,, | 5 p.ct. by vol. | 4·60 ,, | 4 p.ct. by vol. |
| Naphthalene, not more than | trace | 6 ,, ,, wt. | trace | 5 ,, ,, wt. |
| Free carbon | 6·02 p.ct. | Max. 20 p.ct. by wt. | 8·1 p.ct. | 6·0–21 p.ct. by wt. |
| Viscosity | 26 secs. | 10–40 secs. | 84 secs. | 40–125 secs. |

TABLE III.—*Perth Corporation Gas Department.*

[Distillation of 270° C. (0·985 Tar) Thinned with Neutral Oil.]

| Requirements. | 270° C. Tar. | 270° C. + 10 P.Ct. Neutral Oil. | R.D.S. No. 1 Tar. | 270° C. + 5 P.Ct. Neutral Oil. | R.D.S. No. 2 Tar. |
|---|---|---|---|---|---|
| Sp. gr. at 15° C., not lower than | 1·125 | 1·110 | 1·110 | 1·118 | 1·120 |
| ,, ,, not higher than | .. | .. | 1·225 | .. | 1·240 |
| Water or ammoniacal liquor, not more than | trace | trace | 0·5 p.ct. by wt. | trace | 0·5 p.ct. by wt. |
| Other distillates before 200° C., not more than | 0·57 p.ct. | 0·78 p.ct. | 1·0 ,, ,, | 0·34 p.ct. | 1·0 ,, ,, |
| Distillate between 200°–270° C. | 9·08 ,, | 15·15 ,, | 9·5–21 ,, ,, | 12·56 ,, | 8·0–16 ,, ,, |
| ,, ,, 270°–300° C. | 8·24 ,, | 12·03 ,, | 3·5–12 ,, ,, | 10·60 ,, | 3·5–12 ,, ,, |
| Phenols, not more than | 3·94 ,, | 4·5 ,, | 5 ,, by vol. | 4·01 ,, | 4 ,, by vol. |
| Naphthalene | trace | trace | 6 ,, ,, wt. | trace | 5 ,, ,, wt. |
| Free carbon | 4·85 p.ct. | 4·10 p.ct. | 20 ,, ,, | 4·66 p.ct. | 6·21 ,, ,, |
| Viscosity | 98 secs. | 20 secs. | 10–40 secs. | 6·9 secs. | 40–125 secs. |

problem—(1) mechanical, (2) synthetic. The first method has received our attention; the second is merely an idea.

By mechanically reducing the phenol content of a tar I imply not the introduction of any piece of intricate machinery, but merely a method based on simple practicable means. Distillation is continued to a point well past the distilling temperature of the principal phenol fraction, and the residual tar is thinned back with a comparatively neutral oil. Experience in this method has proved that a reliable No. 2 tar may be produced by taking the distillation to 270° C. (equivalent to 0·990 oil distillate gravity) and thinning back with 5 p.ct. neutral oil, while the addition of 10 p.ct. neutral oil brings the tar well within the No. 1 tar specification.

### Bitumen Mixing.

The bitumen mixing plant was installed by Messrs. Chemical Engineering and Wilton's Patent Furnace Co. some five years ago. It consists of two steel cylindrical tanks both 6 ft. in diameter, each capable of holding 1000 gallons and arranged so that the contents of one (*i.e.*, the melter) may be run completely into the other (*i.e.*, the mixer), the melter being mounted and built over a shallow coke-fired furnace and connected by a short length of 2-in. tubing, which runs from a tap in the bottom of the melter through the lid of the mixer, directly opposite. The mixing pot is fitted with a vertical shaft keyed to which impeller blades act as stirrers. The shaft is driven by chain running on a sprocket wheel keyed to the driving shaft of an Evans horizontal reversible flow pump, which serves the double purpose of circulating the mixture and driving the stirrers. The mixer is calibrated with a series of pet cocks arranged so as to determine the proper proportions of tar and bitumen for the mixture specified.

In preparing a mixture, the tar is run hot from the stills into the storage tanks, from which the requisite quantity (as indicated by the level of the tar reaching the predetermined pet cock on the mixer, for the mixture required) is pumped. Liquid bitumen is then run in until 1000 gallons pet cock is reached and the whole kept circulating for approximately 1½ hours. It will be noted that both bitumen and tar are measured hot. The tar on entering the mixer averaging slightly higher than 120° C., while the bitumen is run in at a similar temperature.

### Despatch Yard.

The despatch yard is conveniently situated some 30 ft. below the level of the tar plant, so that the barrelling of tars and mixtures is a comparatively simple matter. Each consignment before despatch has the number of the still, the grade of tar, and code word of the preparation stencilled on the end of each barrel, so that should any complaint be received the distillation can easily be traced.

#### Discussion.

Mr. D. Garrie (Burntisland) said that the method adopted in overcoming the phenol problem (*i.e.*, taking the tar to a higher temperature and thinning back with neutral oil) interested him. How was the neutral oil procured? Was it prepared at the works, and, if so, what fraction was taken?

Mr. Dow explained that the oil used was not prepared at the works, for their own light oil contained anything between 20 and 30 p.ct. of phenol, and they had no dephenolizing plant. Oil containing a maximum phenol content of 6 p.ct. was bought from the tar distillers at approximately ¼d. more per gallon than the price received for crude light oil. At this rate it would be seen that the additional cost per ton of tar treated worked out at an extremely low figure. This oil was in all probability dephenolized light oil. Its cut-point might range between 200° and 240° C.

Mr. Storrier (Dundee) noted that only 1½ hours was given for mixing the bitumen mixture. Was this time sufficient, and was there not trouble with the bitumen settling out? It was his experience in Dundee that even after six hours the bitumen was often found to settle out.

Mr. Dow replied that he could trace no occasion on which complaints had been received due to the bitumen settling out. He mentioned that beneath the stirrers was a sieve plate drilled with ¾-in. holes. Any solid bitumen settling out was deposited there, and the circulation of the hot mixture had undergone three complete circulations.

The President (Mr. J. Scobie) thanked Mr. Dow for his paper.

# National Illumination Committee of Great Britain.

The following extract is from the Report of the Chairman, Lt.-Col. Kenelm Edgcumbe, for the year 1929, presented at the annual special meeting of the Committee on Jan. 30.

The principal activities of the Committee during the past year have been in connection with the carrying-out of the programme of work decided upon by the International Commission on Illumination at the Bellagio and Saranac meetings, and with the preliminary preparations for the 1931 meeting of the Commission, which is to be held in England.

The National Committee have appointed a number of Sub-Committees to deal with the subjects of which the Commission are making a special study, for five of which the British Committee have accepted the secretariat responsibility. Responsibility for the other subjects is divided among the other countries which are members of the Commission. In connection with most of these subjects the British Sub-Committees are in fairly close touch with their corresponding Sub-Committees abroad. In a few cases the contact is not so good. The British Sub-Committees are all at work, and it is hoped that fuller co-operation will now be secured and that the imminence of the 1931 meeting will result in more intensive efforts in all countries.

The subject of lighting education was initiated at the 1928 meeting after discussion of a report on the present state of the subject which was prepared by the United States National

**[Continued on page 202.]**

## STOCK AND SHARE LIST.

**[For Stock Market Report, see earlier pages.]**

| Issue. | Share. | When ex-Dividend. | Dividends. Prev. Hf. Yr. | Dividends. Last Hf. Yr. | NAME. | Quotations. Apl. 17. | Rise or Fall on Week. | Transactions Lowest and Highest Prices During the Week. |
|---|---|---|---|---|---|---|---|---|
| £ | | | % p.a. | % p.a. | | | | |
| 171,978 | Stk. | Feb. 6 | 5 | 5 | Aldershot 5 p.c. max. C. . | 73—78 | .. | .. |
| 522,992 | ,, | ,, | 4 | 4 | Do. 4 p.c. Pref. . . | 70—73 | .. | .. |
| 1,551,868 | ,, | Apl. 3 | 7⅞ | 7⅞ | Alliance & Dublin Ord. . . | 92—95* | .. | 96½ |
| 374,000 | ,, | Jan. 9 | 4 | 4 | Do. 4 p.c. Deb. . . | 60—63 | .. | .. |
| 522,655 | ,, | Mar. 6 | 7 | 7 | Barnet Ord. 7 p.c. . . . | 109—112 | .. | .. |
| 300,000 | 1 | Oct. 24 | 1/4⅛ | 1/4⅛ | Bombay, Ltd. . . . . | 16/--18/- | .. | .. |
| 174,500 | 10 | Mar. 6 | 9 | 9 | Bournemouth 5 p.c. . . . | 13½—14½ | .. | .. |
| 500,050 | 10 | ,, | 7 | 7 | Do. B 7 p.c. . . | 12½—12⅞ | .. | 12⅝ |
| 439,160 | 10 | ,, | 6 | 6 | Do. Pref. 6 p.c. . | 10½—11½ | .. | .. |
| 50,000 | Stk. | Dec. 19 | 3 | 3 | Do. 3 p.c. Deb. . | 55—58 | .. | .. |
| 162,025 | ,, | ,, | 4 | 4 | Do. 4 p.c. Deb. . | 74—77 | .. | .. |
| 357,900 | ,, | Mar. 20 | 7½ | 7½ | Brighton & Hove 6 p.c. Con. | 113—116 | .. | .. |
| 371,880 | ,, | ,, | 6⅔ | 6⅔ | Do. 5 p.c. Con. | 100—103 | .. | .. |
| 1,287,500 | ,, | Feb. 20 | 5 | 5 | Bristol 5 p.c. max. . . . . | 87½—88½*a* | .. | .. |
| 855,000 | ,, | Apl. 3 | 7 | 8 | British Ord. . . . . | 110—115 | .. | 111½—112 |
| 100,000 | ,, | Dec 19 | 7 | 7 | Do. 7 p.c. Pref. . . . . | 115—120 | .. | .. |
| 120,000 | ,, | ,, | 4 | 4 | Do. 4 p.c. Red. Deb. . . | 69—71 | .. | .. |
| 450 000 | ,, | ,, | 5 | 5 | Do. 5 p.c. Red. Deb. . . | 92—95 | .. | .. |
| 100,000 | ,, | Jan. 9 | 5 | 5 | Cambridge 5 p.c. Deb. . . | 90—93 | .. | .. |
| 100,000 | 10 | Dec. 5 | 8 | 6 | Cape Town, Ltd. . . . . | 8½—9½ | .. | .. |
| 100.000 | 10 | Nov. 7 | 4½ | 4½ | Do. 4½ p.c. Pref. . . | 6½—7½ | .. | .. |
| 150,000 | Stk. | Dec. 19 | 4½ | 4½ | Do. 4½ p.c. Deb. . . | 69—74 | .. | .. |
| 626,860 | ,, | Feb. 20 | 6 | 6 | Cardiff Con. Ord. . . . . | 96—99 | .. | .. |
| 237,860 | ,, | Jan. 9 | 7½ | 7½ | Do. 7½ p.c. Red. Deb. . | 98—101 | .. | .. |
| 157,150 | ,, | Feb. 20 | 5 | 6½ | Chester 5 p.c. Ord. . . . . | 87½—92½*b* | .. | .. |
| 98,936 | 1 | Oct. 10 | †2/- | †2/- | Colombo, Ltd. Ord. . . . | 34/—36/- | .. | .. |
| 24,495 | 1 | ,, | 1/4⅛ | 1/4⅛ | Do. 7 p.c. Pref. . . | 19/—21/- | .. | .. |
| 375,402 | 1 | Apl. 3 | 1/9½ | 1/9½ | Colonial Gas Assn. Ld. Ord | 20/—22/-* | .. | .. |
| 187,848 | 1 | ,, | 1/7½ | 1/7½ | Do. 8 p.c. Pref. | 19/—21/-* | .. | .. |
| 2,073,280 | Stk. | Feb. 20 | 5 | 7 | Commercial Ord. . . . . | 89—92 | .. | 90¾—91¼ |
| 475,000 | ,, | Dec. 19 | 3 | 3 | Do. 3 p.c. Deb. . . | 57—60 | .. | 58 |
| 787,560 | ,, | Feb. 20 | 7 | 7 | Croydon sliding scale. . . | 104—107 | .. | 105½—106½ |
| 453,100 | ,, | ,, | 5 | 5 | Do. max. div. . . . | 83—86 | .. | .. |
| 542,270 | ,, | Mar. 6 | 7 | 10 | Derby Con. . . . . | 115—125*e* | .. | .. |
| 55,000 | ,, | Dec. 19 | 4 | 4 | Do. Deb. . . . . | 67—70*e* | .. | .. |
| 209,000 | ,, | Mar. 6 | 5 | 5 | East Hull Ord. 5 p.c. . . | 71—73 | .. | .. |
| 1,002,180 | 10 | Mar. 20 | †4 | †7 | European, Ltd. . . . . | 14½—15½ | .. | 14⅞—15⅝ |
| 18,629,125 | Stk. | Feb. 20 | 5⅜ | 5⅜ | Gas Light & Coke 4 p.c. Ord. | 18/9—19/3*f* | .. | 18/9—19/2½ |
| 2,600,000 | ,, | ,, | 3½ | 3½ | Do. 3½ p.c. max. . . . | 63—65 | + ½ | 63½—64½ |
| 4,157,020 | ,, | ,, | 4 | 4 | Do. 4 p.c. Con. Pref. . . | 77—80 | .. | 77—78½ |
| 5,602,620 | ,, | Dec. 19 | 3 | 3 | Do. 3 p.c. Con. Deb. . . | 58—61 | .. | 60—61 |
| 3,642,770 | ,, | ,, | 5 | 5 | Do. 5 p.c. Red. Deb. . . | 98—101 | .. | .. |
| 82,500 | ,, | Mar. 20 | 7 | 7 | Hastings & St. L. 5 p.c. Conv. | 96—101 | .. | .. |
| 258,740 | ,, | ,, | 5½ | 5½ | Do. 3½ p.c. Conv. | 78—83 | .. | .. |
| 70,000 | 10 | Oct. 10 | †10 | †10 | Hongkong & China, Ltd. . | 13½—14½ | .. | .. |
| 213,200 | Stk. | Mar. 6 | 6 | 6 | Hornsey Con. 3½ p.c. . . . | 90—93 | .. | .. |
| 1,976,000 | ,, | Nov. 1 | 20 | 10 | Imperial Continental Cap. . | 390—410 | .. | 393—401 |
| 223,130 | ,, | Feb. 6 | 3½ | 3½ | Do. 3½ p.c. Red. Deb. | 75—85 | .. | .. |
| 235,242 | ,, | Mar. 20 | 8½ | 8½ | Lea Bridge 5 p.c. Ord. . . | 112—115 | .. | .. |
| 2,145,907 | ,, | Feb. 20 | 6 | 6 | Liverpool 5 p.c. Ord. . . . | 90¾—91½*b* | +1½ | .. |
| 600,000 | ,, | Mar. 20 | 7 | 7 | Do. 7 p.c. Red. Pref. . | 100—102*b* | +1 | .. |
| 165,736 | ,, | Feb. 20 | 9 | 8 | Maidstone 5 p.c. Cap. . . | 119—124 | .. | .. |
| 63,480 | ,, | Dec. 19 | 3 | 3 | Do. 3 p.c. Deb. . . | 52—55 | .. | .. |
| 75,000 | 5 | Dec. 5 | †10 | †10 | Malta & Mediterranean . . | 5½—6 | .. | .. |
| 392,000 | — | Apl. 1 | 5½ | 5½ | Metrop'itan (of Melbourne) 5½ p.c. Red. Deb. . . . | 90—93* | .. | .. |
| 541,920 | Stk. | Nov. 21 | †9 | †6 | Montevideo, Ltd. . . . . | 107—112 | .. | .. |
| 2,061,315 | ,, | Feb. 20 | 5 | 5⅔ | Newcastle & Gateshead Con. | 15/6—16/3*df* | .. | .. |
| 682,856 | ,, | ,, | 4 | 4 | Do. 4 p.c. Pref. . | 70—71*d* | .. | .. |
| 691,705 | ,, | Dec. 19 | 3½ | 3½ | Do. 3½ p.c. Deb. . | 66½—67½*d* | .. | .. |
| 169,940 | ,, | Mar. 6 | 7½ | 7½ | North Middlesex 6 p.c. Con. | 109—114 | .. | .. |
| 396,160 | ,, | Feb. 6 | 5 | 5 | Northampton 5 p.c. max. . | 74—77 | .. | .. |
| 300,000 | ,, | Nov. 21 | 7 | 9 | Oriental, Ltd. . . . . | 108—113 | .. | .. |
| 60,000 | 5 | 13 My., '15 | — | — | Ottoman . . . . . | 0—¼ | .. | .. |
| 205,162 | Stk | Jan. 9 | 8 | 8 | Plym'th & Stonehouse 5 p.c. | 107—110 | .. | .. |
| 424,416 | ,, | Feb. 20 | 8 | 8 | Portsm'th Con. Stk. 4 p.c. Std | 110—115 | .. | .. |
| 241,446 | ,, | ,, | 5 | 5 | Do. 5 p.c. max. . . | 78—81 | .. | .. |
| 2,999,464 | 1 | June 27 | — | ‡5 | Primitiva Ord. . . . . | 28/—30/- | .. | .. |
| 186,000 | 100 | Dec. 2 | 4 | 4 | Do. 4 p.c. Red. Deb. . . | 92—95 | .. | 93½ |
| 677,837 | Stk. | Jan. 23 | 4 | 4 | Do. 4 p.c. Red. Deb. 1911 | 81—84 | .. | .. |
| 371,496 | ,, | Dec. 19 | 4 | 4 | Do. 4 p.c. Cons. Deb. . | 81—84 | .. | 82 |
| 150,000 | 10 | Apl. 3 | 6 | 6 | San Paulo 6 p.c. Pref. . . | 8½—9* | .. | .. |
| 1,736,968 | Stk. | Mar. 20 | 6½ | 6½ | Sheffield Cons. . . . . | 102—104*e* | .. | .. |
| 95,000 | ,, | Jan. 9 | 4 | 4 | Do. 4 p.c. Deb. . . . . | 76—78*e* | .. | .. |
| 90.000 | 10 | June 13 | ‡4 | ‡4 | South African . . . . . | 4—6 | .. | .. |
| 6,709,895 | Stk. | Feb. 20 | 5 | 7½ | South Met. Ord. . . . . | 100—103 | .. | 101½—102½ |
| 500,000 | ,, | ,, | 6 | 6 | Do. 6 p.c. Irred. Pf. | 107—110 | .. | 108½—109½ |
| 1,895,445 | ,, | Jan. 9 | 3 | 3 | Do. 3 p.c. Deb. . . | 58—61 | .. | .. |
| 734,000 | ,, | Mar. 6 | 6½ | 6½ | Do. 6½ p.c. Red. Db. | 99—101 | +1 | 99½—100 |
| 91,500 | ,, | Mar. 20 | 8½ | 8½ | South Shields Con. . . . | 105½—107½*d* | .. | .. |
| 1,543,795 | ,, | Feb. 20 | 6½ | 6½ | South Suburban Ord. 5 p.c. | 100—103 | +2 | 99½—100½ |
| 468,827 | ,, | Dec. 19 | 5 | 5 | Do. 5 p.c. Deb. | 92—95 | .. | .. |
| 647,740 | ,, | Feb. 20 | 5 | 5 | Southampton Ord. 5 p.c. max. | 76—79 | .. | .. |
| 121,275 | ,, | Dec. 19 | 4 | 4 | Do. 4 p.c. Deb. | 72—75 | .. | .. |
| 179,014 | ,, | Feb. 20 | 8 | 8 | Sutton Ord. . . . . | 113—116 | .. | .. |
| 67,828 | ,, | Jan. 9 | 5 | 5 | Do. 5 p.c. Deb. . . . | 91—94 | .. | .. |
| 250,000 | ,, | Mar. 6 | 7 | 7 | Swansea 7 p.c. Red. Pref. . | 98—100 | .. | .. |
| 200,000 | ,, | Dec. 19 | 6½ | 6½ | Do. 6½ p.c. Red. Deb. . | 99—101 | .. | .. |
| 1,076,490 | ,, | Mar. 6 | 6⅔ | 6⅔ | Tottenham District Ord. . | 101—105 | .. | 103½ |
| 150,000 | ,, | ,, | 5½ | 5½ | Do. 5½ p.c. Pref. . . | 95—98 | .. | .. |
| 199,005 | ,, | Dec. 5 | 4 | 4 | Do. 4 p.c. Deb. . . | 73—76 | +3 | 73—74½ |
| 182,380 | 10 | 30 Dec., '12 | — | — | Tuscan, Ltd. . . . . | 3¾—4¾ | .. | .. |
| 85,701 | Stk. | Mar. 20 | 6 | 6 | Do. 6 p.c. Red. Deb. | 75—80 | .. | .. |
| 309,094 | ,, | Mar. 6 | 7 | 7 | Uxbridge, Maidenhead, & Wycombe 5 p.c. . . . . | 94—99 | .. | .. |
| 88,330 | ,, | ,, | 5 | 5 | Do. 5 p.c. pref. . . | 85—90 | .. | .. |
| 1,180,970 | ,, | — | — | — | Wandsworth, Wimbledon, and Epsom Cons. . . | 108—113 | +1 | .. |
| 200,000 | ,, | Feb. 20 | 5 | 5 | Do. 5 p.c. Pref. . . . . | 85—90 | .. | .. |
| 488,344 | ,, | Dec. 19 | 5 | 5 | Do. 5 p.c. Deb. . . . . | 92—97 | .. | .. |

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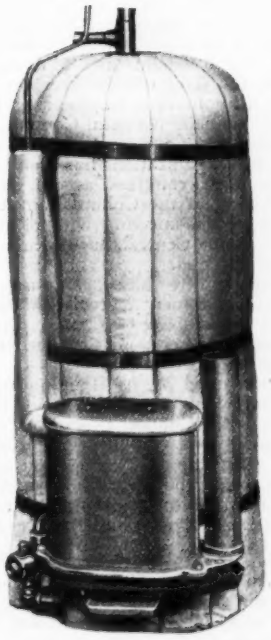

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**National Illumination Committee of Great Britain**—*Continued.*

Committee. The British Sub-Committee have requested information from those countries which did not contribute to that report. They have also proposed the preparation of a handbook on photometry and illumination which would serve to supplement the available text-books on optics in secondary and junior technical schools. Members of the Sub-Committee have discussed the method of preparation of such a handbook with a Sub-Committee of the Illuminating Engineering Society, when it was decided that they should report to their respective organizations in favour of the proposal.

The report of the International Committee on Factory and School Lighting presented at the 1928 meeting of the Commission has been considered, with special reference to the method of grading light sources in respect of glare as proposed by the American Committee. The Sub-Committee have had the opportunity of discussing with two factory inspectors, who have attended a meeting of the Sub-Committee, the desirable measurements of illumination in factories which it is recommended that visiting factory inspectors should make. Information relating to modern practice in office lighting is also being collected.

The Sub-Committee on Street Lighting have been actively engaged in the revision of the Street Lighting Specification (British Standard Specification No. 307-1927). The demonstration given in Sheffield in 1927 of the installations designed to illustrate the various methods of complying with the specification showed that the specification came through the test very creditably, although it indicated one or two points on which modifications were necessary. It is these points that the Sub-Committee are now looking into, so that they may be prepared to put forward their latest considerations at the 1931 meeting. As a result of the meeting held in America last year, the Sub-Committee are considering the inclusion of " average " as well as " minimum " illumination in the specification.

Preparations for the 1931 meeting of the International Commission on Illumination, which is being held in Great Britain at the invitation of the British Committee, were begun early in the year. It was decided that the meeting of the Commission should be associated with an International Illumination Congress, which would visit a number of places of interest to illuminating engineers where papers would be presented.

The Illuminating Engineering Society have agreed to co-operate with the National Committee in the organization of the congress, and an Executive Committee consisting of members of the two organizations has been set up to deal with all matters relative to the congress, as well as the non-technical portion of the meeting of the Commission at Cambridge. The technical aspects of this meeting will, of course, be directly under the control of the Central Bureau and the Executive Committee of the Commission.

The Committee have been strengthened during the past year by the appointment of representatives of the Air Ministry, the British Commercial Gas Association, the British Electrical Development Association, and the Incorporated Municipal Electrical Association.

In the report of the Illumination Section of the British Engineering Standards Association for 1929, prepared for the National Illumination Committee, it is stated that the Section have again been very active, in preparation for the 1931 meeting of the International Commission on Illumination.

Due to incorporation by Royal Charter, a certain amount of reorganization has taken place within the Association. The work is now divided into Industry Sections. Each section consists of:

(1) An Industry Committee who are responsible, under the direction of the Council, for the work of the Association in so far as their particular section is concerned.

(2) Such Technical Committees as are necessary to assist the Industry Committee in carrying out their work.

(3) Any contributing members of the Association who are definitely interested in that particular section.

Under the Charter and By-Laws, a meeting of the whole Section has to be held once a year, at which three members are elected to the Council of the Association to represent that Section.

A meeting of the Illumination Section was held in October, 1929, at which Col. Edgcumbe, Mr. F. W. Goodenough, and Mr. C. C. Paterson were elected to represent the Illumination Industry Section on the Council.

*Technical Committee 2, Nomenclature and Definitions,* are acting as a Sub-Committee for the National Illumination Committee on this subject, and in this capacity have agreed to the use of the C.G.S. system, and have also drawn up, in consultation with a Sub-Committee on Diffusing Materials, certain terms and definitions relating to these materials.

*Technical Committee 3, Lighting Fittings.*—The principal work of this Committee during the past year has been the preparation of a method of describing the performance of lighting fittings. This has taken some time to prepare, as considerable difficulties presented themselves, but the Committee have now prepared what they feel to be a very satisfactory report. This has been sent forward not only to the National Illumination Committee for transmission to the other National Committees, but has also been presented to the Illumination Industry Committee for issue as a British standard. The Lighting Fittings Committee are also carrying out a series of investigations in connection with diffusing materials, which work is also principally for the National Illumination Committee.

*Technical Committee 5, Street Lighting.*—This Committee are revising British Standard Specification No. 307, in the light of experience gained very largely through the demonstration which was carried out at Sheffield in 1928. As a result of the meetings held in America last year, they are also considering the inclusion of average as well as minimum illumination in the specification.

## Metropolitan Gas Company of Melbourne.

### Chairman's Address at the One Hundred-and-Fourth Half-Yearly Meeting.

In moving the adoption of the report and accounts at the 104th Half-Yearly Meeting of the Metropolitan Gas Company of Melbourne, held on Jan. 28, the Chairman (Sir John Grice) said: The report and balance-sheet for the half-year ended Dec. 31, 1929, is now submitted for your consideration. The result does not allow of any transfer to reserve fund. It also involves a reduction of the amount carried forward by approximately £20,000, which is justifiable, as the balance of profit carried forward in a good year is for the purpose of a return to shareholders in an indifferent one.

Referring to the expenditure and revenue figures, the cost of coal, including materials used in production of carburetted water gas, was £429,855, compared with £364,737 for the December half of 1928—an increase of £65,118. The tonnage of coal carbonized was 146,641, to which has to be added 1,235,466 gallons of oil and 8155 tons of coke. The revenue from gas sales for the half-year is £791,248, being an increase of £42,180 over the corresponding period of 1928, but it must be noted that on the meter readings from Oct. 12, 1929—approximately three months—the price of gas charged was 7s. 6d. per 1000 c.ft., whereas for the whole of the December half of 1928 it was 7s. 1d. For the full year 1929 gas sales reached 4,222,391,000 c.ft., compared with 4,156,151,000 c.ft. for the year 1928, an increase of 66,240,000 c.ft., or 1·594 p.ct.

#### Residuals.

From the sale of residuals £135,878 was derived in comparison with £137,532 for the December half of 1928. For the full year 1929 receipts from residuals were £262,806, being lower by £10,517 than for the year 1928. Comparing in detail the quantity of residuals sold and used in manufacture with that of the previous year, you will find in regard to coke that in the year 1929 171,850 tons were sold and 41,289 tons used in manufacture, and that in 1928 179,407 tons were sold and 67,151 tons used in manufacture. As regards tar, in 1929 3,906,821 gallons were sold and 1,106,891 gallons used in manufacture, and in 1928 4,218,121 gallons were sold and 869,860 gallons used in manufacture.

As a result of the general depression during the past twelve months many manufacturers have been running their factories on a reduced output, particularly during the latter part of the year, and sales of coke have fallen off. During the second half of 1929 a contract was entered into with the Country Roads Board to supply approximately 170,000 gallons of intermediate tar for use as a primer coat on macadamized roads.

The report shows that the profits for the half-year were £100,772. Of this amount £36,184 has been debited to net revenue account to provide for writing down plant at Fitzroy, certified by the Engineer to be obsolete. This obsolete plant still remains in our books at £25,000, and if possible will be dealt with at the end of the current half-year. After this deduction there is only £64,588 profit, and as a dividend for the half-year at the rate of 6s. 6d. per share is recommended, the amount carried forward, which stood at £61,116, has been drawn upon to the extent of £19,911, leaving a balance in the carry forward of £41,205. There is again no transfer to reserve fund.

Owing to the greater cost of production, brought about by the Northern New South Wales coal stoppage and the consequent necessity of importing coal, the price of gas had, during the half-year, to be raised by 5d. per 1000 c.ft., an increase of less than 6 p.ct. on the previous price.

A pleasing feature of the year's business was the frequency of the displacement of the coal range by gas equipment in the larger suburban residences. During the year 175 large kitchen appliances were disposed of for hotels, cafés, restaurants, &c., and to these establishments 67 hot water services were also supplied. Regarding industrial appliances, the sales show 410, as against 474 in 1928, a decrease of 64, accounted for mainly by slackness of trade.

During the half-year ten miles of mains were laid, and thirty-five miles of consumers' services installed. During the current year new depôts will be opened in Glenhuntly Road, Caulfield, and Sydney Road, Brunswick. It is satisfactory to report a further reduction in the quantity of unaccounted-for gas, the figures for the year being 12·49 p.ct., and for the half-year under review 12·05 p.ct. of the total make, which is the lowest for any half-year since June, 1925.

The Chairman then moved the adoption of the report and balance-sheet. The motion was seconded by Mr. L. Evans and carried unanimously.

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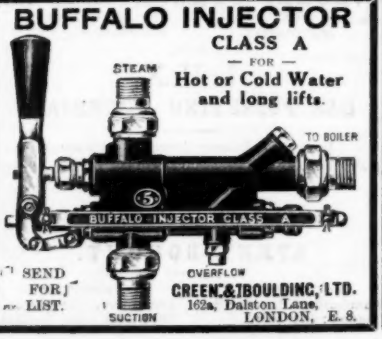

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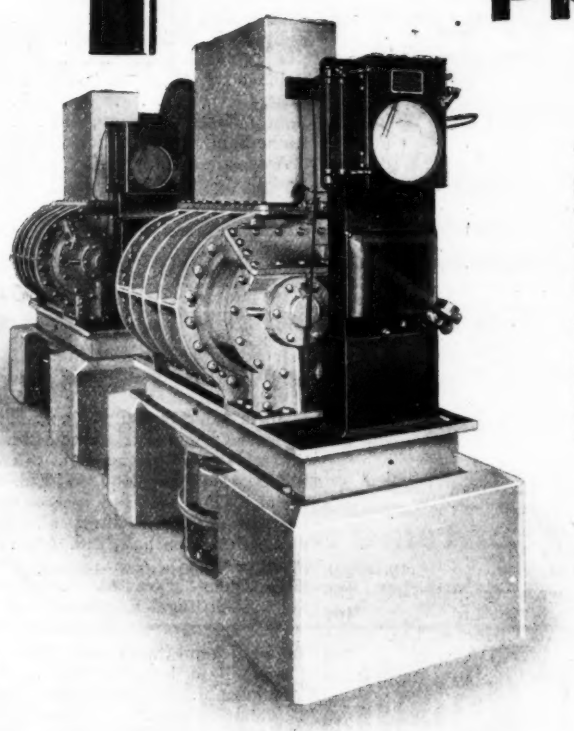

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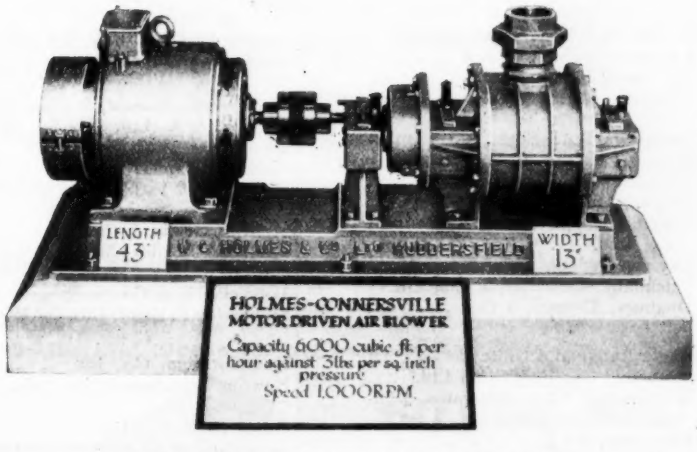


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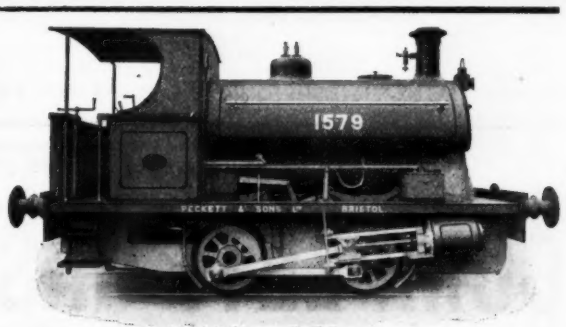


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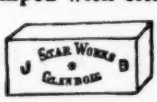
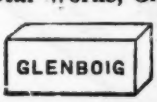
REGISTERED 

TRADE 

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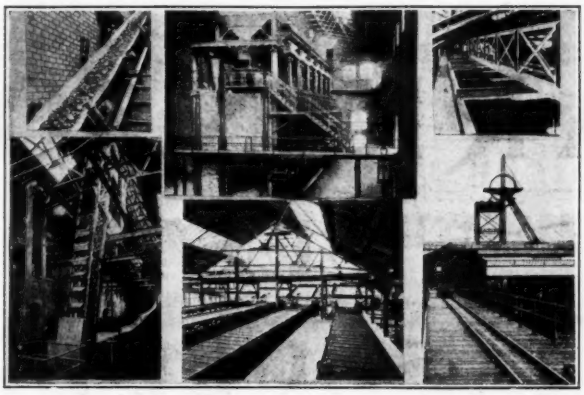

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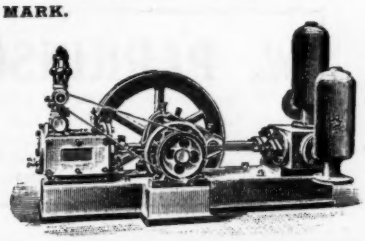

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Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

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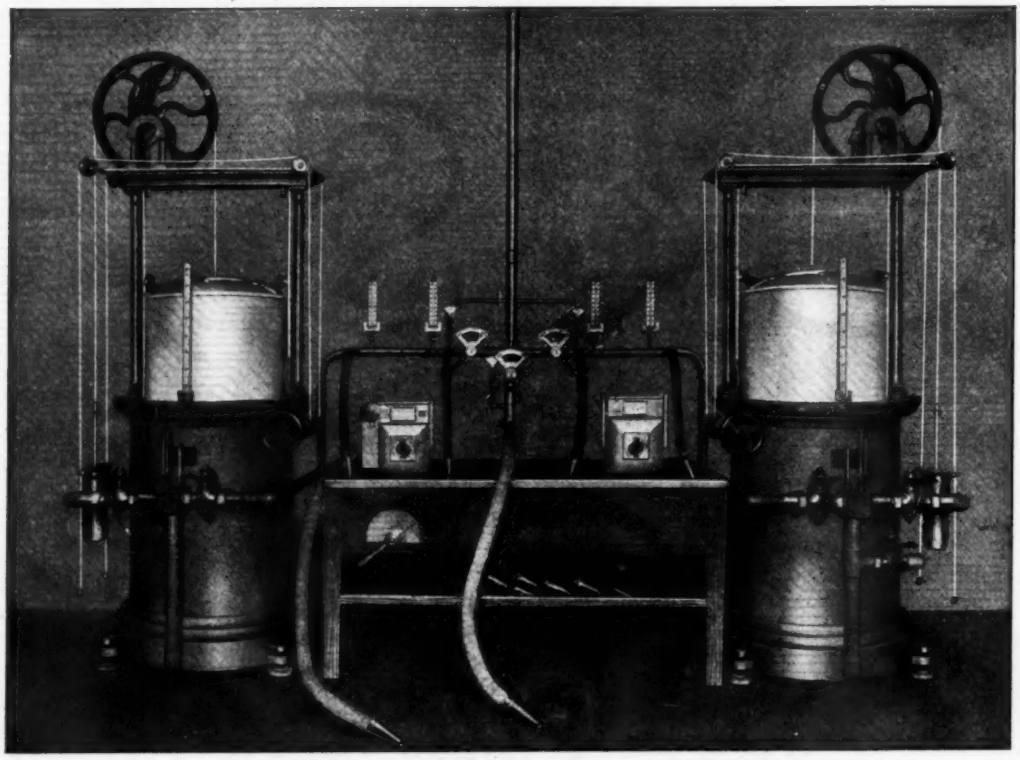

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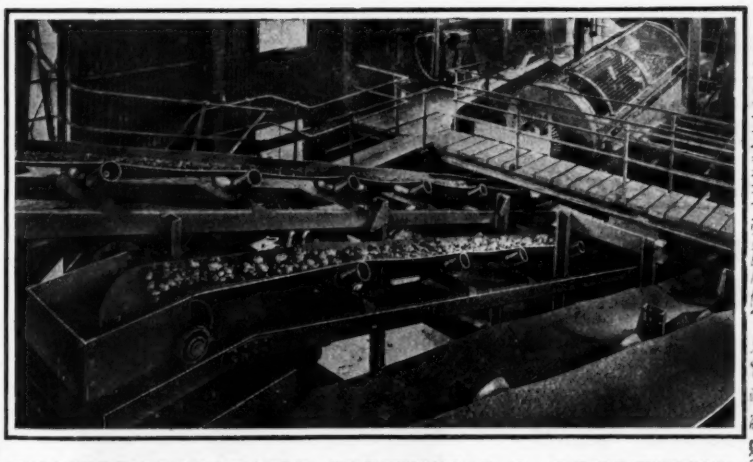

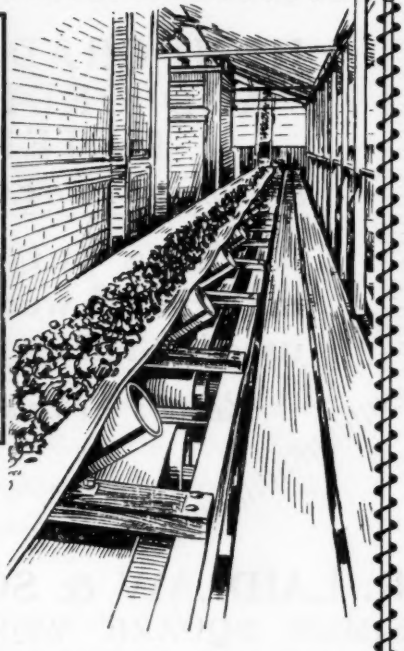

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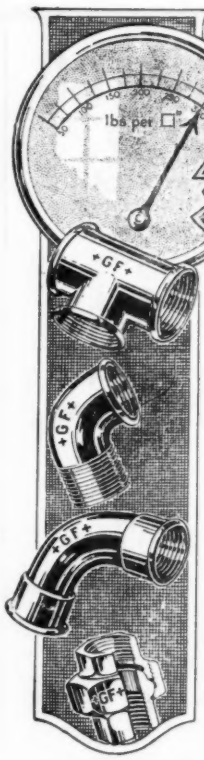


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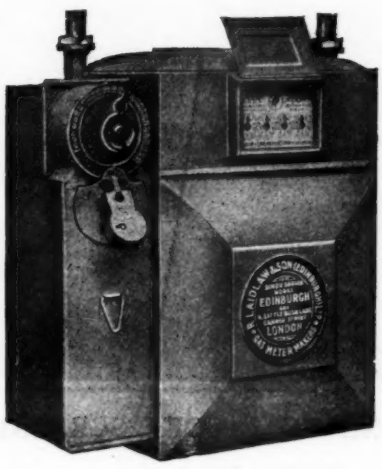


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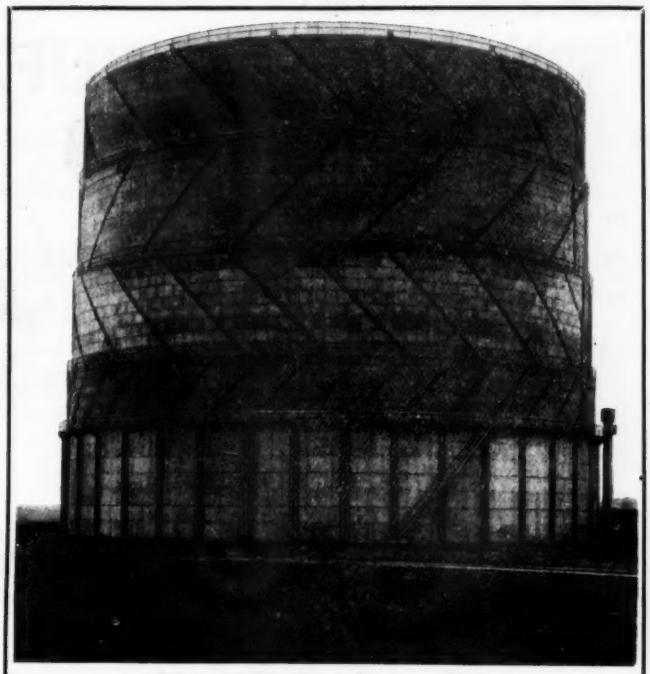

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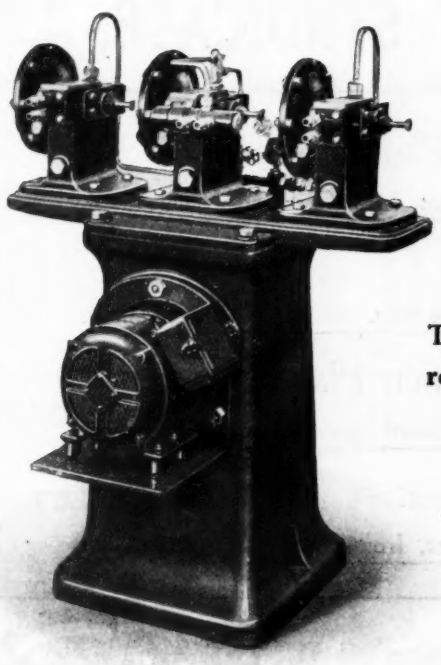

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